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THE INFLUENCE OF DIET IN HEALTH AND DISEASE.¹

By N. M. GUTTERIDGE,
Brisbane.

NUTRITION is the branch of organized knowledge which attempts to place on a scientific basis the influence of diet in health and disease. Nutrition is primarily a branch of biochemistry, but in its wider implications it embraces a variety of other sciences. Related as it is to the environment of man and his proper adaptation to that environment, nutrition is the corner-stone of human ecology.

Human nutrition is primarily dependent on the soil and its productivity, and the serious evidence of soil erosion in Australia provides a threat which is nutritional as well as economic.

The Right Honourable R. G. Menzies drew attention to the great Australian paradox when he said: "There is no country in the world where men's eyes looked so far, or where men's minds saw so little distance ahead."¹

The wide open spaces of Australia are both an opportunity and a challenge to the feeding of our population—an opportunity, because we now know that it requires at least two acres of fertile land to produce the food that one person needs to remain well-nourished. Australia is one of the few countries to have this proportion of land to population, even after allowance is made for the 70% of infertile land in Australia and the decreasing fertility of the soil. We have the opportunity here to have the best-fed nation in the world. It is doubtful whether any other nation has the same opportunity. Certainly India, China and Japan cannot hope to feed their population on the fertile land of their own country.

But Australia's open spaces are also, in a way, a challenge. Our population is crowded into large cities and is scattered to many points. The problem is to provide the food in a form which will retain those virtues of freshness expressed as flavour and nutritional value. This challenge can be met by the development of refrigeration and food processing, and by better local planning of food production.

The eating habits of various peoples have been determined by such factors as the nature of available crops, social customs, religious beliefs and taboos. This brings nutrition into the realms of social psychology and anthropology. Food, moreover, represents an important cultural symbol.

Nutrition is destined to play an important part in the developing interest in social or constructive medicine. Constructive medicine has been defined as the deliberate and conscious creation of conditions under which human beings can thrive and flourish. It may briefly be described as "human gardening"; an attitude of mind which is more that of the engineer than that of the curative physician. It is a path of progress which involves planning rather than patching. The United Nations Conference on Food and Agriculture struck this note when it stated that "through diet a new level of health can be attained, enabling mankind to develop inherited capacities to the fullest extent".

Nutrition has a special interest to Australia in relation to her population problems. In view of the declining fertility of her population, there is an obvious urgency to replace the deficiencies in quantity by an increase in quality. The New Guinea campaign provided a striking example of this principle. The Australian troops in New Guinea were hopelessly outnumbered by the Japanese; but the outcome was influenced by the better standard of nutrition of the Australian troops.

In the form of fresh food a man requires about five pounds of food every day, and he will eat his own weight

¹The Stawell Prize Essay for 1944 (submitted to examiners on November 30, 1944).

in food every month. Stripped down to its bare essentials, but provided that the food is in a form which can be eaten without preparation, this weight can be reduced to about three pounds.

This war has developed into a battle of supply. In the Pacific the United Nations have shown their superiority in this arm of the service. Food has indeed become a munition of war. The varying fortunes of war in the Middle East were partly due to the alternate stretching and contracting of the lines of supply. "D Day" in France represented a supply problem without precedent in the world's history. Rapid advances must be followed by a delay during which supplies must be built up. The allied army of 3,500,000 ranged along the Western Front needed at least 8,000 tons of food per day.

Historical Aspects.

"The fate of nations depends upon how they are fed."
(Brillat-Savarin.)

The diets of the people of past ages have shown varying degrees of satisfaction of the now known human nutritional needs—with the result that some civilizations have languished on unbalanced diets, while others, having better balanced dietary habits, have survived to the present day. The Egyptians, about the time of the building of the pyramids, became very lazy in agricultural and pastoral pursuits. Their consequently restricted diet led to a malnutrition which proved to be the forerunner of the downfall of their civilization. The Israelites, on the other hand, who engaged largely in pastoral pursuits, were provided with the larger variety of food factors obtained from meat and milk. The Israelite lived "beneath the shade of his own vine and fig tree". His agrarian policy was an outstanding example of production planning for nutritional needs.

England probably reached the zenith of her nutritional history in the seventeenth century. Catherine of Aragon had introduced salad vegetables from Spain; Sir Walter Raleigh had brought the potato; oranges had been brought from Portugal; and root crops such as turnips were being largely cultivated. The "jolly miller" in each village ground the whole wheat grain freshly each day.

It is easy to find examples of military campaigns which failed because of faulty nutrition. Even as far back as the fifth century B.C., when Xerxes tried to invade Greece from Persia, the campaign failed because of shortage of food. The food resources of Greece are slender, as is only too evident today. All the Holy Crusades against the heathen Saracen about the tenth century A.D. came to an inglorious end around Antioch because of scurvy and disease. At Kut-el-Amara in the 1914-1918 war, a British garrison had to surrender because of scurvy. A tragic feature of that debacle was that nobody in the garrison knew that ascorbic acid could be developed from dry grain (of which they had ample supplies) by germination.

A New Concept of Dietary Deficiency Disease.

Physicians whose background is mainly in the curative field of medicine say that although they have been looking for dietary deficiency diseases they rarely or never see them. Nutrition surveys reveal, however, that many diets are deficient. Average blood levels of specific nutrients in large groups are much lower than normal. The practising physician asks for the clinical evidence of such deficiency. At first sight this would seem to be a definite discrepancy, but a newer concept has now clarified it. When physicians speak of deficiency diseases they think mainly of the severe, acute forms, and those are the forms which most animal experiments aim at producing, and those forms are the ones fully described in medical literature.

But it should be realized that biological behaviour is a product of both time and intensity. The acute deficiency disease is the product of high intensity and short time. Such acute deficiency responds well to treatment. On the other hand, the chronic deficiency is low in intensity but long in time. It develops slowly and responds poorly to treatment. This concept has been developed by Kruse⁽¹⁾ (Figure 1).

Many of the chronic deficiency conditions are so common and prevalent that they are regarded as usual or normal. The prevalence and severity of the chronic processes increase with age. Most of the chronic changes have hitherto been mistakenly regarded as characteristics of senescence, although they are really deficiencies developing slowly over a lifetime.

The practising physician is referring to acute severe deficiency states operating for a short time. The nutritionist is referring to the mild chronic deficiency which has been operating for a long time.

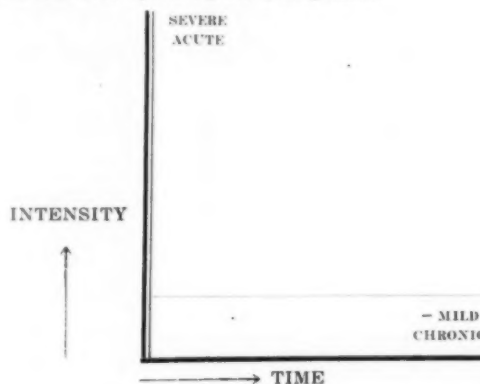


FIGURE 1.

A new concept of deficiency disease by Kruse. The classical deficiencies are the product of severe intensity and short time. The main nutrition problems are the result of low intensity and long time.

The Pathogenesis of Dietary Deficiencies.

Deficiency diseases occur not only because of a deficiency in the intake. "Deficiency" properly refers to a deficiency in the body tissues. This relates deficiency more specifically to cellular needs, and to disturbances of digestion, circulatory transport, absorption, storage or excretion.

The pathogenesis of dietary deficiency diseases has been clarified by Kruse.⁽²⁾ There are five stages: (a) lowered concentration of the nutrient in the blood; (b) depleted storage in the body's reservoirs; (c) diminished excretion in the urine; (d) microscopic changes in the tissues; (e) gross morphological and functional change recognizable by clinical means. An evaluation of nutritional status can best be made by a study of the early stages of development.

Concentration of the Nutrient in the Blood.

Estimations of plasma ascorbic acid content, serum protein level and haemoglobin value are now established as practical procedures in the determination of nutritional levels in population groups.

Level of Storage in the Body.

Depleted storage can be investigated by nutrient tolerance tests in which the response of the blood or urinary level can be studied in relation to the ingestion of a standard dose of a nutrient.

Excretory Level.

The estimation of nutrients in the urine of a fasting subject can be an indication of the nutritional status, although the renal threshold for some nutrients is not clearly established, and storage capacity may vary. In the case of ascorbic acid, the renal threshold is in the region of 1.2 milligrammes of ascorbic acid per 100 millilitres of plasma.⁽³⁾ The ascorbic acid excretion usually varies between 0.5 and 1.5 milligrammes per hour. The thiamin excretion usually varies between three and thirty microgrammes per hour, and the excretion of riboflavin between 20 and 75 microgrammes per hour. The urinary excretion of niacin is complicated by the multiple pyridine compounds present in the urine, which are the form in which niacin is mainly excreted.

When the excretion of these nutrients falls to zero, that fact usually indicates that the borderline of deficiency has

been reached and the body no longer has a surplus available for excretion. Degrees of deficiency below those which give a zero "morning hour excretion" must be evaluated by load tests.

Microscopic Changes in the Tissues.

By the use of the biomicroscope or slit lamp, changes in the tissues can be detected at an early stage.

Ascorbic Acid Deficiency.—In ascorbic acid deficiency, the dental gingivæ are the site of election of pathological change. Kruse⁽⁵⁾ has described how the acute process in the first stage produces in the subsurface vascular papillæ an engorged and dilated state, which may be evident only in the interdental papillæ. In a more intense condition the vascular reaction, occurring more diffusely, may be seen over the entire gum. In the second stage, the gum becomes red. The redness forms a serrated line across the free margin, but is always deeper in shade than the less affected alveolar gum. Very little swelling is present at this stage. The line of vascular demarcation usually present at the labial border of the gum may now be less distinguishable or entirely indistinguishable, as the gingival surface assumes a hue nearly similar to that of the labial mucosa. In the third stage, the reddened gum undergoes swelling. When the process is chronic (that is, a mild deficiency operating over a long period), there are three stages. In the first stage, there are slight dilatation and engorgement of the subsurface vascular papillæ, which impart a light redness to the gums. A slight swelling first appears in the interdental papillæ and later spreads to the gingival margin. In the next stage, œdema obscures the vascular reaction; the gum appears swollen but pale. In the third stage, the atrophy becomes more profound. The papillæ decrease in size and gradually recede, exposing the cementum of the teeth. At any stage in the chronic process there may be a superadded exacerbation, so that the features of the acute stage may be superimposed on those of the chronic.

Riboflavin Deficiency.—The early recognition of riboflavin deficiency has been considerably assisted by the use of the slit lamp. The earliest and most common sign, according to Stannus,⁽⁶⁾ is circumcorneal injection. Other signs are injection of the bulbar and palpebral conjunctiva and of the fornix, engorgement of the limbic plexus, and vascularization of the cornea. Superficial opacities and deeper interstitial changes, either diffuse or patchy, can be seen, also congestion of the sclera and iris. Visual acuity tends to be impaired and mydriasis may be noted. It is considered that the corneal changes are due to an interference with the normal oxidation of the capillaries due to the deficiency of the coenzyme riboflavin. The vessels dilate as an attempt at compensation. The other main site of election is the lips. Here are seen angular or marginal stomatitis and cheilosis. The angular stomatitis is indicated by fissures at the corners of the mouth. This is often associated with an oily desquamation around the nose, in the nasolabial fold and on the ears. There are also pitted lesions near the muco-cutaneous borders of the lips resulting from small ulcerations which do not completely heal.

Niacin Deficiency.—Niacin deficiency produces changes in the tongue which have been well described by Kruse.⁽⁷⁾ In the rapidly developing forms, there are vascularity and hypertrophy of the fungiform papillæ, which impart to the tongue first the familiar stippled, then later the strawberry, aspect. Redness and swelling, marginal indentation, and then "baldness" manifest themselves in the tongue. In the chronic form, the stages of progression in the papillæ are: vascular hyperæmia and proliferation, infiltration and atrophy. As the chronic process advances, the tongue itself shows fissures, crevices and loss of substance, the general appearance being a thin tongue with marginal serrations.

Vitamin A Deficiency.—Increased vascularity of the conjunctiva, keratinization and piling-up of the epithelial cells to form the lesions hitherto referred to as Bitot's spots, and xerosis conjunctivæ, are considered by Kruse to be the earliest detectable changes in hypovitaminosis A, even preceding failure of dark adaptation. This hypothesis has not been widely accepted; but the unsatisfactory results

obtained from dark-adaptation studies would make welcome such early microscopic evidence of deficiency.

Consideration of Some Specific Nutrient Factors.

Protein.

A study of the protein content of blood provides a useful index of protein intake. The standards are as follows:

Total protein: 6.0 to 6.8 milligrammes per 100 millilitres of plasma.

Albumin: 4.0 to 4.5 milligrammes per 100 millilitres of plasma.

Globulin: 1.8 to 2.5 milligrammes per 100 millilitres of plasma.

Deficiencies are most commonly found in children.

A recent report to the Associate Committee on Army Medical Research of the National Research Council of Canada⁽⁸⁾ shows that an increase in nitrogen excretion and a decrease in voluntary food intake follow trauma, resulting in a negative nitrogen balance of varying duration and intensity. This nitrogen may be derived from either the food or the body protein. The authors of this report recommend an increase of the protein intake to at least 100 grammes, and in some cases it may be necessary to increase the intake to 200 grammes per day. The nitrogen loss, which reaches its maximum in the first week after trauma, is succeeded after a varying period of time by a tendency to retention. Equilibrium is maintained as weight is regained. These changes occur more readily in previously healthy, well-nourished adults than in those who are chronically ill.

The negative nitrogen balance is considered to be due to the operation of an S hormone secreted by the adrenal cortex. The adrenal cortex also secretes an N hormone which is similar to testosterone. This hormone causes a positive nitrogen balance. It is the varying balance between these two hormones which causes the biphasic phenomenon. The authors recommend between-meal feedings of egg and milk mixtures providing 41 grammes of total protein and 600 grammes of total calories per feed.

Thiamin.

Thiamin is one of the useful indices of the presence in the ration of those enzymes known collectively as "the vitamin B complex". These enzymes are necessary for the oxidation of carbohydrate and possibly protein by the body cells with release of energy. When thiamin intake is inadequate, energy production is incomplete. Half-way oxidation products (such as pyruvic acid) accumulate in the tissues and are excreted in the urine.

Thiamin is not needed for the metabolism of fat. If 30% of the total calories of an average mixed ration are deducted as being supplied from fat, and if the average of the needs of man at all three stages of activity are taken, it is found that 0.8 microgramme of thiamin is required for the complete oxidation of one Calorie from sources other than fat.

If 0.8 microgramme of thiamin per non-fat Calorie is taken as a balance point, and if normal foods are arranged in order of their content of thiamin per non-fat Calorie (after the deduction of losses in preparation), it will be seen that foods arrange themselves into thiamin assets and thiamin liabilities. By adjusting the intake of both types of food, a balance for the total ration can be achieved (Table I).

As an indication of the low power of storage of thiamin in the human body, the average daily urinary excretion of thiamin of thirteen young men during a four-day fast was as follows:⁽⁹⁾ on normal diet, 216 γ ; first fast day, 126 γ ; second fast day, 88 γ ; third fast day, 72 γ ; fourth fast day, 65 γ . This evidence explains man's earlier susceptibility to depletion of thiamin as compared with that of other vitamins of the B group. Storage time of thiamin in the body is limited to about thirty-six hours.

To raise the thiamin intake, action has been taken in the Australian army to grind to a fine flour the entire seed of peas (blue boiler—*Pisum sativum*), to increase their practical utilization as an item of daily ration. In this form the vegetable has more scope for preparation than in its condition as harvested.

TABLE I.

Status.	Food.	Microgrammes per Non-Fat Calorie.	
Thiamin assets	Legumes	2.0	
	Oatmeal	1.9	
	Wheatmeal	1.6	
	Beef	1.4	
	Mutton	1.2	
	Vegetables, salad	1.1	
	Milk	1.1	
Balance point	Rice, unpolished	0.8	
	Potatoes	0.7	0.8
	Vegetables, cooked	0.7	
	Wholemeal bread 40%	0.7	
	Wheatgerm bread 6%	0.7	
	Fruit, fresh and canned	0.5	
	Bread, white	0.4	
Level to prevent beriberi	Fish	0.3	0.3
	Flour, white	0.2	
	Rice, polished	0.08	
	Ready-to-eat breakfast foods	Trace	
	Sago, tapioca	Trace	
	Biscuits, sweet	Trace	
	Honey, jam	Trace	
Thiamin liabilities	Confectionery	Trace	
	Beer	Trace	
	Sugar	Nil	

Ascorbic Acid.

Although the value of estimation of the ascorbic acid in the plasma is limited in the individual case, estimations among large groups of subjects to obtain an average level provide a useful index of intake standards.

In studies made for the Associate Committee on Army Medical Research, Canadian Army,⁽¹⁰⁾ the average ascorbic acid level in the plasma of 25 control subjects (Royal Canadian Army Military Academy medical students) was 0.44 milligramme per 100 millilitres of plasma. The average level among 108 medically fit draftees on enlistment was 0.19 milligramme. Two months later 57 of these draftees were reexamined, and the average figure was then 0.49 milligramme per 100 millilitres of plasma.

The average level in 170 random-selected ambulatory patients at an Australian army hospital in Victoria was 0.39 milligramme per 100 millilitres. Among 1,000 industrial workers studied in the United States of America by the Committee on Nutrition in Industry,⁽¹¹⁾ 43% had plasma ascorbic acid levels below 0.50 milligramme per 100 millilitres. In the Australian series 72.3% had levels below 0.50 milligramme per 100 millilitres.

Plasma levels below 0.6 milligramme per 100 millilitres indicate less than optimal dietary intake of ascorbic acid, and levels below 0.4 milligramme per 100 millilitres are considered by most students as abnormal.⁽¹²⁾

A comparison between these figures in Australia and those obtained at a survey by Borsook *et alii*⁽¹³⁾ of 1,160 workers in the Lockheed aircraft factory in Southern California is given in Table II.

TABLE II.

Ascorbic Acid. (Milligrammes per 100 Millilitres of Plasma.)	Percentage of Totals.	
	Australian Army.	Lockheed Air- craft Workers.
Less than 0.20	28.2	10.7
0.20 to 0.39	33.0	21.8
0.40 to 0.59	20.0	19.9
0.60 to 0.79	9.3	17.8
0.80 to 0.99	7.0	14.1
1.00 to 1.19	0.6	8.4
1.20 to 1.39	0.6	4.7
1.40 to 1.59	0.6	1.4
1.60 to 1.79	—	0.7
1.80 or more	—	0.5

In New Zealand, tests on the blood plasma of personnel at two military camps (Trentham, 48 men, and Burnham, 106 men) gave average values of 0.24 milligramme and 0.29 milligramme per 100 millilitres respectively. At

another military camp (Woodbourne, 110 men and women) the average was 0.23 milligramme per 100 millilitres.⁽¹⁴⁾

It is significant that the mean value among 26 students and staff members of the Otago University was 0.86 milligramme per 100 millilitres.⁽¹⁵⁾

With further reference to the figures obtained in the Australian army, Bryce⁽¹⁶⁾ determined over a period of one week the ascorbic acid content of all meals at the time of serving to the forty patients in one ward at a large military hospital in Victoria. It was found that the total ascorbic acid intake per patient per day was 14.25 milligrammes. This total did not include the fresh fruit issued to the patients. During the week under survey the ward was provided from army sources with 130 oranges, 130 lemons and 54 apples. Apart from the apples, however, this fruit was converted into drinks which were given only to febrile patients. Therefore the majority in the ward received no oranges or lemons from the hospital issue.

An important deduction that can be drawn from these figures is that there are serious losses in ascorbic acid in the bulk cooking and keeping hot of vegetables served under conditions of bulk cooking. It has been found⁽¹⁷⁾ in one study that the losses in restaurant cooking can be as high as 95% of the ascorbic acid and thiamin contents. In the case of mashed potatoes, for instance, 10% can be lost in peeling, 15% destroyed by the heat of cooking, 35% dissolved in the cooking water and a further 20% lost in keeping the food hot for half an hour. So that, in all, an 80% loss of ascorbic acid by preparation, heat, oxidation by air and enzyme action can occur. In a large medical or military unit, where the food is all prepared in a central kitchen, between one and two hours commonly elapses between the time when the food is cooked and the time when it is actually consumed. The effect of keeping cooked cabbage or potato hot can be seen by reference to the following chart (Figure II).⁽¹⁸⁾

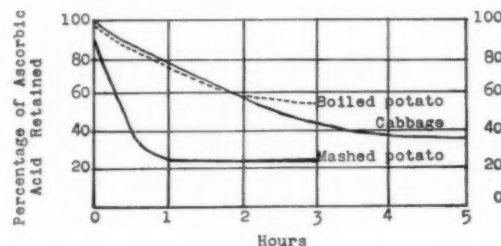


FIGURE II.

In a survey by Goodhart of cafeteria foods in a New York war factory cafeteria, it was found that up to 92% of the thiamin and 82% of the ascorbic acid were lost in preparation.⁽¹⁹⁾ The average losses of ascorbic acid and thiamin were 75% and 70% respectively, with a range of 29% to 96%. About 20% of the vitamins were destroyed by cooking, about 25% were lost in the discarded cooking water, and an additional 25% were lost on the steam table.⁽²⁰⁾

Iron.

Iron is an element, and unlike other nutrients it is not destroyed or used up in the body, but is conserved, and if not excreted it can be utilized again and again. That iron deficiency in the ration always results in the red cells becoming deficient in haemoglobin (hypochromic) and smaller (microcytic) than normal is not correct; but it is true for growing children and for women during their menstrual life or during pregnancy, or for any person who has lost or is losing considerable amounts of blood from some region of the body. The point has been clearly made by Heath.⁽²¹⁾

In growth there is a need for iron to supply the haemoglobin to the expanding blood volume. In women during their menstrual life the greater need for iron is usually not recognized.

In a study of the haemoglobin values of a cross-section of the 12,000 donor applicants for the Red Cross Blood Transfusion Service in Queensland, there was found a sig-

nificantly lower hæmoglobin value for housewives in particular, and women in general, than for men.

All applicants for donor service were subjects to a hæmoglobin estimation at the time of their first registration and blood grouping. As most of these applicants were examined by the "assembly line" technique at the rate of 100 per hour, the hæmoglobin estimation could be made only by the Tallquist method, to provide a preliminary "screening" into those above and those below the arbitrary acceptance percentage of 80%. This hæmoglobin level was subsequently checked, just prior to the taking of blood, by the acid hæmatin (Hellige) method standardized to fourteen grammes of hæmoglobin per 100 cubic centimetres of blood. The correspondence between the two readings was surprisingly close. Of the total donor applicants, 6.3% were not accepted owing to their hæmoglobin value being below 80%. These were referred for treatment.

TABLE IIIA.
Accepted Donors.

Hæmoglobin. (Percentage.)	Total Accepted Applicants. (Percentage.)	Males. (Percentage.)	All Females. (Percentage.)	Housewives. (Percentage.)
100 and over ..	28	45	6	8
90 to 99 ..	49	48	52	45
80 to 89 ..	23	7	42	47

TABLE IIIB.
Donors not Accepted Owing to Low Hæmoglobin Value.

Hæmoglobin. (Percentage.)	Total Rejectees. (Percentage.)	Males. (Percentage.)	All Females. (Percentage.)	Housewives. (Percentage.)
70 to 79 ..	90	—	96	86
60 to 69 ..	6	—	4	9
50 to 59 ..	2	—	—	3
40 to 49 ..	2	—	—	2

Iron is, of course, not the only nutrient factor in blood formation.

Surveys in Britain and the United States of America have shown much lower hæmoglobin levels in females than in males.

Recommended Dietary Allowances.

The recommended dietary allowances were developed by the Food and Nutrition Board of the National Research

Council of the United States of America, and in May, 1943, they were adopted by the United Nations Conference on Food and Agriculture.⁽²⁰⁾

These allowances give concrete expression to the statement of the conference that "the kind of diet which man requires for health has been established". There is no finality about these standards, and they are certain to be varied in the light of further research; but they do represent a most useful working yardstick. When converted into foodstuffs they enable production to be planned and storage depots to be maintained in a balanced condition, and they provide a working basis for the evaluation and correction of ration scales. They provide a standard against which the results of actual intake surveys can be compared. The figures given are calculated requirements for food as eaten, and do not allow for losses in cooking. Since such losses may be extensive, especially those of the water-soluble vitamins, it is necessary to make provision for them in planning the bulk of "as purchased" nutrient factors.

The allowances are not complete. They do not cover every nutrient need of the human animal, but in practice it is found that if the nutrients as recommended are provided in the form of natural foods, it is reasonable to expect that the other nutrient factors not included will also be present.

These allowances are for persons in health, and needs may vary considerably in disease. In febrile conditions, for example, there is usually an increased need for Calories, thiamin and ascorbic acid.

The Estimation of Intake Standards.

It is clear that there is not one single method of evaluation of nutritional status that will be completely satisfactory. But the one method which will provide more information than any other is to estimate the nutritional value, in terms of nutrients, of the food actually consumed. The daily totals can then be compared with the recommended allowances.

This method of study can provide a useful starting point of an investigation into such practical aspects of group feeding as acceptability of the various foods supplied, standards of presentation, undue waste in preparation, equitable distribution of the bulk ration supplied, proportion of edible food in the issue and the adequacy of the ration scale.

The survey is carried out by selecting a round number of personnel to be studied (say ten). An average serving

TABLE IV.

Subject.	Calories.	Protein. (Grammes.)	Calcium. (Grammes.)	Iron. (Milli-grammes.)	Vitamin A. (Inter- national Units.)	Thiamin (B ₁). (Milli-grammes.)	Riboflavin. (Milli-grammes.)	Niacin (Nicotinic Acid). (Milli-grammes.)	Ascorbic Acid (Vitamin C) (Milli-grammes.)	Vitamin D. (International Units.)
Man (70 kilograms):										
Sedentary	2,500	70	0.8	12	5,000	1.5	2.2	15	75	
Moderately active ..	3,000					1.8	2.7	18		
Very active	4,500					2.3	3.3	23		
Woman (56 kilograms):										
Sedentary	2,100	60	0.8	12	5,000	1.2	1.8	12	70	
Moderately active ..	2,500					1.5	2.2	15		
Very active	3,000					1.8	2.7	18		
Pregnancy (latter half)	2,500	85	1.5	15	6,000	1.8	2.5	18	100	400 to 800
Lactation	3,000	100	2.0	15	8,000	2.3	3.0	23	150	400 to 800
Children up to 12 years:										
Under 1 year	100 per kilogram	3 to 4 per kilo-gram	1.0	6	1,500	0.4	0.6	4	30	400 to 800
1 to 3 years	1,200	40	1.0	7	2,000	0.6	0.9	6	35	
4 to 6 years	1,600	50	1.0	8	2,500	0.8	1.2	8	50	
7 to 9 years	2,000	60	1.0	10	3,500	1.0	1.5	10	60	
10 to 12 years	2,500	70	1.2	12	4,500	1.2	1.8	12	75	
Children over 12 years:										
Girls:										
13 to 15 years	2,800	80	1.3	15	5,000	1.4	2.0	14	80	
16 to 20 years	2,400	75	1.0	15	5,000	1.2	1.8	12	80	
Boys:										
13 to 15 years	3,200	85	1.4	15	5,000	1.6	2.4	16	90	
16 to 20 years	3,800	100	1.4	15	6,000	2.0	3.0	20	100	

of each course in the meal is taken and each component part is weighed separately. Plate wastage for the group is collected in individual containers, and the average wastage per head is deducted. The "table" foods (such as bread, milk, sugar, butter and jam) are weighed before and after the meal. A record is kept of "between-meal" foods consumed.

The food actually consumed is expressed in weights of the average consumption. This food is then converted into nutrient factors and the intake is expressed as a percentage of satisfaction of the nutrient factors required for the age group under study.

Nutrition Standards and Economic Status.

"There has never been enough food in the world for the people of the world to eat", stated the United Nations Conference on Food and Agriculture. The groups which will carry more than their share of this food shortage will be those with the lower incomes.

Nearly every day, in general practice in an industrial suburb, I felt a hypocrite when recommending a diet adequate to satisfy the needs, knowing that to purchase these foods would absorb almost the whole of the weekly wage. A simple sum in arithmetic will make the position clear.

The average daily cost of all the rations with allowances supplied to the Australian army is 23.495 pence on Melbourne contract prices. It would be unreasonable to expect the housewife would be able to purchase the same food under at least thirty pence. It could scarcely be said that the standard of army feeding is higher than necessary, but it is as adequate nutritionally as the Australian food pattern will allow, although not every nutrient factor is fully satisfied in the food as consumed.

The weekly cost to the housewife would then be 17s. 6d. Multiply this by five in the family, and the total weekly cost of food alone comes to £4 7s. 6d. While the cost of food for the average young child would be only about two-thirds of the adult cost, that for the adolescent and the expectant and nursing mother would be more. The cost of the food recommended in the British Medical Association (Queensland Branch) diet scale for the expectant and nursing mother, based on present Sydney retail prices, is 3s. 3d. per day, or £1 2s. 9d. per week.

On these grounds alone, is there any reason for complacency in regard to the nutritional intake standards of the lower income group of the Australian people? And when it is realized that Australia is amongst the best fed nations of the world, it can be imagined what the nutritional status of other nations will be.

Statistics of disease and mortality indicate a definite relationship between economic levels and health standards.

Clark⁽²⁰⁾ has shown that as income rises the caloric intake increases the most steeply of all the nutrient factors. At the lower income levels the Calories are inadequate. At the upper levels there must be wastage of food (Figures III to VI).

The Nutrition of the Expectant and Nursing Mother.

From the standpoint of nutrition, life begins at conception. The nutrition of the expectant mother has become one of the most fruitful fields of application of the new knowledge of nutritional needs.

In 1936 a pamphlet was prepared for distribution to the maternity patients in my practice. This dietary provided 3,253 Calories, 96 grammes of protein, 2.2 grammes of calcium, 14 milligrammes of iron, 15,000 international units of vitamin A, 1.9 milligrammes of thiamin, 3.3 milligrammes of riboflavin, 14 milligrammes of niacin and 119 milligrammes of ascorbic acid. In the following year this pamphlet was endorsed by the Nutrition Research Subcommittee and the Obstetrical Section of the Queensland Branch of the British Medical Association, and it was issued to all members. It was published in THE MEDICAL JOURNAL OF AUSTRALIA.⁽²¹⁾ In all, over the past seven years, 1,100 pamphlets have been issued to the members of the British Medical Association in Queensland for distribution to their maternity patients.

It has been difficult to obtain reports from Queensland Branch members as to the clinical effect of this dietary instruction. My own series of patients was only 88, all of whom were also personally instructed. Table V shows the results expressed per thousand cases, and these are compared with an analysis published in 1932 of 2,000 consecutive obstetric cases occurring in the private practice of members of the Obstetrical Section of the Queensland Branch of the British Medical Association.

TABLE V.

Abnormalities.	Queensland Branch Members, 2,000 Cases (per 1,000).	Series of 88 Cases (per 1,000).
Maternal deaths	4.0	Nil
Stillbirths (including macerated foetus)	33.0	11.4
Eclampsia	6.0	Nil
Albuminuria	68.0	11.4
Pyelitis	17.0	Nil
Ante-partum haemorrhage	8.5	Nil
Post-partum haemorrhage	19.0	Nil
Puerperal morbidity	73.0	Nil
Severe sepsis	3.5	Nil
Mild sepsis	26.0	Nil

There were only three abnormal cases in the 88. An elderly *primipara*, aged forty-two years, had a stillborn child. There had been a prolonged first stage lasting fifty-two hours. The only case of albuminuria occurred in a young *primipara*, aged twenty-four years, who had a history of occasional albuminuria. Renal efficiency tests had given normal results before pregnancy. Three weeks before full term she developed severe bronchitis and *otitis media*, with which was associated mild albuminuria without rise in blood pressure. She was kept in bed for the last three weeks, and had an uneventful delivery and puerperium. Her sister had died of kidney disease following childbirth. There was a suggestion of lead poisoning in the early family life. There was one case of retained placenta, which was manually removed after twenty hours; the puerperium was otherwise normal.

It is difficult to present a detached report on the health of the children of this series, but every mother was asked to bring the child at the age of six months for diphtheria immunization, and this was usually the only time the children were examined. Every mother reported that her child had been unusually well, and had been free of most of the usual childhood illnesses. It was found that measles, for instance, was of only a few days' duration and presented only a mild bronchitis with an evanescent rash.

There is no record of any child being other than breast fed. Every mother was directed to the baby clinic for supervision.

Many mothers stated that their menstrual periods returned early in the lactating period. It is known that, although milk is deficient in iron, the loss in milk during lactation is greater than it would normally be during menstrual life. This experience suggests that the cessation of menstruation during lactation is an iron-sparing phenomenon. Could it be that, with adequate nutrition during lactation, menstruation is normal?

Every mother of the series was asked to take her child every year to the Department of Dentistry of the University of Queensland for a dental examination, where a detailed record was made of the condition of the teeth. As there are no records for Queensland of the condition of the teeth of children under school age, no comparison with the general standard of dental health is possible until school age is attained. The number of children of this series who have reached school age is not yet sufficient to allow significant conclusions to be drawn.

One of the best summaries of the influence of diet on pregnancy is given by Nixon,⁽²²⁾ and from it are taken the following conclusions:

1. There is a significant reduction in the stillbirth and neonatal mortality rates of a controlled group of 11,618

women who received a dietary supplement providing, each day, 0.72 milligramme of thiamin, 13,500 international units of vitamin A, and 2,250 international units of vitamin D. (National Birthday Trust Fund, Wales, 1934-1939.)

2. There was a reduction in threatened and actual miscarriages, premature births, stillbirths and toxæmias of pregnancy in a group of expectant mothers in Toronto whose diet was supplemented to bring it into line with what are now recognized to be international standards. It was found that the babies were less subject to colds,

was a reduction in the incidence of premature delivery and toxæmia of pregnancy.

4. In Norway, in 1939, premature delivery and toxæmia of pregnancy were reduced by the proper feeding of expectant and nursing mothers. Lactation was improved, and rickets in the children was reduced.

It is significant that all the countries of Europe that have strict rationing recognize the priority needs of the

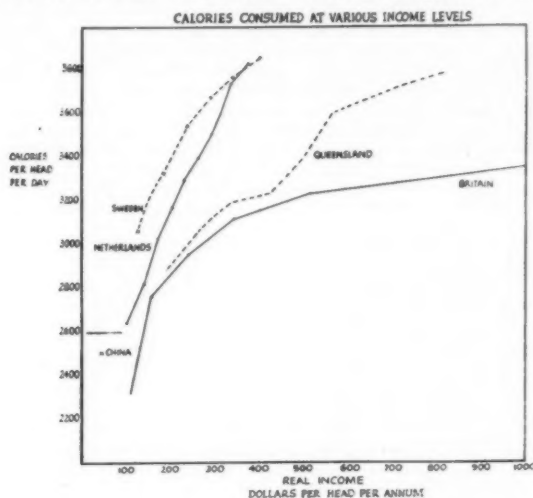


FIGURE III.

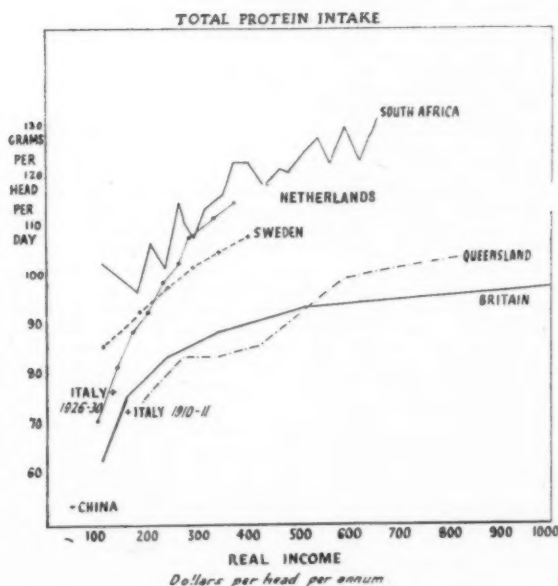


FIGURE IV.

Total protein intake also rises with income, but not so steeply as intake of Calories.

pneumonia, rickets and anaemia. Breast feeding was possible by a greater number of these women than among those whose diet was not supplemented.

3. In a series of 5,000 expectant mothers observed in London in 1938 and 1939, who received supplements of calcium, iron, iodine and vitamins A, B, C and D, there

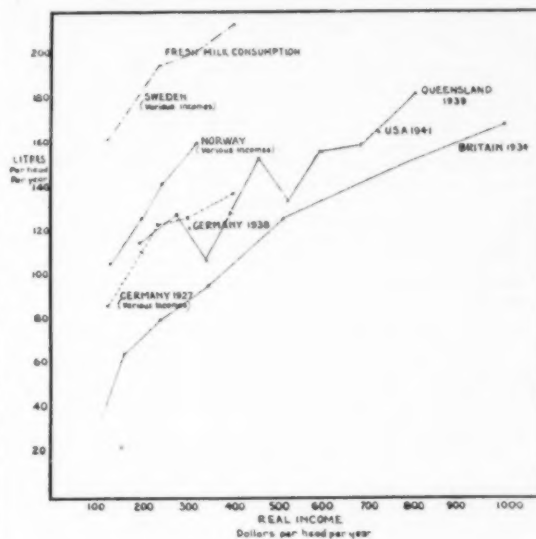


FIGURE V.

Fresh milk consumption shows a marked and uniform rise throughout the whole range of incomes.

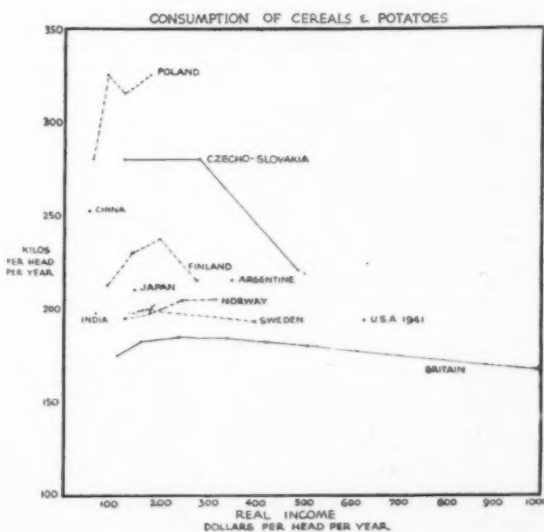


FIGURE VI.

Consumption of cereals and potatoes, on the other hand, falls as income rises.

expectant and nursing mother. These, with the young child, have been described as the "vulnerable group". The word "priority" rather than "vulnerable" is preferred because of its more positive flavour.

The available evidence indicates that in the nutrition of the expectant and nursing mother and the young child lies the most effective single factor in the control of dental

decay. The adequate nutrition of the patient in accordance with the dietary needs will provide the growing formative cells of the tooth—the ameloblasts, the odontoblasts and the cementoblasts—with the materials they need for proper development. Disproportionate attention has been paid to the calcification of these structures. It has not been fully appreciated that calcification is a comparatively late stage of development. Only those cells which are formed can be calcified. Calcium is important in cell formation, but not necessarily more important than the other nutrients in relation either to tooth formation or to general bodily growth and development and maintenance. It was unfortunate that the over-emphasis on calcium in relation to tooth formation led to disappointment when calcium was taken in the form of some inorganic preparation. Some ten years will have to elapse before comparative results can be obtained showing the effect on the level of dentition of the child of standard intakes of nutrients by the expectant mother; but already there is ample evidence to justify the education of the mother through her medical adviser to consume the recommended standards of nutrients. It is obvious that there is a deficiency in the intake of the average expectant mother in Australia, especially in regard to thiamin, calcium, ascorbic acid and riboflavin.

The Nutrition of the Adolescent.

Early this year a survey was made of the nutritional standards at a large public school in Victoria.¹ In relation to the needs of boys in that age group, it was found that the intake of the boarders provided only 80% of the Calories, 90% of the protein, 70% of the calcium, 65% of the thiamin, 80% of the ascorbic acid, 65% of the riboflavin and 60% of the niacin. The general level of catering and presentation of food was anything but modern, and completely out of accord with a school of high standing in the community. This is bad both nutritionally and educationally.

Milk was looked upon as an extra, whereas the needs of the age group required a consumption of one and a half pints of milk per day per boy. The use of wheatmeal bread and of cooked oatmeal cereal in place of the ready-to-eat breakfast foods supplied for breakfast would partly overcome the deficiency in thiamin. There was an over-supply of white bread rolls, pies, buns and cakes from the tuck shop, and action was recommended to replace these and to extend the service in the direction of wholemeal rolls with cheese and lettuce, pea or tomato soup, wholemeal buns, bottled milk, orange juice drinks and oatmeal shortcake. A school cafeteria is even more necessary than usual in these days of inadequate domestic help to cut and prepare suitable lunches. In any case, the usual sandwich lunch is a poor imitation of a balanced meal. It is believed that this situation is only too common even amongst public schools of good standing in Australia.

It is not yet sufficiently realized that the school cafeteria has an educational as well as a nutritional function.

Nutrition Education.

From an early age, external influences, such as the family's food habits, national or religious customs, anti-social food advertising, or food availability, all operate to form a food pattern which becomes deeply fixed in the individual's personality. These food patterns become a stronger force than instinct in the selection of food. It could not be expected that such chance influences would lead the individual to consume those foods which would satisfy needs as now known. A stoker with abdominal cramps will not be conscious of his need for salt, and a human can be unconscious of the need for other nutrients, such as ascorbic acid, riboflavin and thiamin. A useful concept of this phenomenon is "hidden hunger". Knowledge as well as instinct is necessary to the human in the selection of his foods.

Experience in the United States of America with the "nutrition for defence" project has shown that commercial

interests can be coordinated into a soundly based nutrition education project. Since 1935, similar experience with the Queensland Nutrition Council's education programme has shown that cooperation with commercial interests is possible, to the social good. In fact, commercial interests can be too dangerously anti-social to be neglected.

The most serious weakness in the attitude of Australians to nutrition is their lack of appreciation of the two types of appetite. These might be called "gastric" and "cellular" appetite. Gastric appetite is readily satisfied with such high-satiety foods as bread and jam, hot sweet tea, biscuits, chocolate, sweet cakes, boiled pudding, and perhaps meat. These give a sense of well-being and repletion, but are seriously inadequate in at least five nutrients—iron, calcium, vitamin A, thiamin and ascorbic acid.

The satisfaction of "cellular" appetite, on the other hand, while also satisfying "gastric" appetite, requires a knowledge of nutrient needs. It is a reflection on the Australian school education (even that of the Great Public Schools) that children leave school without the knowledge of how to nourish their bodies—surely the basis of education for life.

Motivation in Nutrition Education.

It has been said that it would be unprofitable to "sell" heaven to an Eskimo by preaching the horrors of hell fire. So the first step in nutrition education is to know to what motives to appeal. The motives differ with each age and group. The object of seeking a motive is to make a better standard of nutrition significant and purposeful.

The expectant or nursing mother is easy to interest in nutrition; her main preoccupation is with her child. She should be assured that the baby of the well-nourished mother is no larger than that of the not-so-well-nourished.

The secret of the nourishment of the young child is the skilful early introduction of a wide variety of nourishing foods, and the prevention of a taste for sweet foods. Throughout the growing years the most useful principle is to "build the family food habits round the child's needs". Children are naturally imitative, and they will eat what the adults eat.

Up to the age of ten or twelve years, the appeal to a boy should be to his desire to beat the "other boy" at school games. During the "gang" age of twelve to sixteen years, the appeal is to his team spirit. At a later age still, when his sense of manhood is developing, the desire for social approval provides a strong motive.

For the young girl from seven years onward, the appeal is to bright eyes, glossy hair, pearly even teeth, a good well-rounded figure and the desire to be attractive. That appeal seems to be effective throughout her life.

Sooner or later in our study of motivation, we come to an even deeper consideration: "Are people as a whole really and urgently interested in being healthy and vigorous?" Some people genuinely are, and everyone obviously ought to be; but one is inclined to be doubtful whether there is a natural and universal yearning for positive health apart from war, team competitions and the health of an unborn child.

The long-term solution would seem to be a scientifically guided development of social customs to make it easy, desirable and natural to adopt a way of life which will lead to satisfaction of the nutritional needs. To this end, the school cafeteria, the communal dining room, the home cookery class, the newspaper article and the radio session can make their contributions. And that means that the teacher, the writer, the caterer and the institutional manager must first be thoroughly taught the newer knowledge of nutritional needs. The educational authorities must realize that it costs less to educate healthy children than delicate children, and the education is preparation for complete living.

The community should realize that the cost of medical care is becoming greater than the individual can afford by any system of spreading the cost, and that it is cheaper to keep the people well-nourished than to patch them up when they become ill. It should be realized that nothing could be more expensive than chronic preventable illness.

¹ The intake survey at this school was carried out by Mrs. N. Paterson, dietitian.

Experience with Nutrition Education.

Broadcasts to Schools.—Experience in nutrition education has been gained over the past six years by the delivery, over the national network to an estimated audience of 300,000 school children, a fifteen-minute broadcast feature on 39 Mondays of the school year. Of these 39 broadcasts, seven have been devoted to nutrition. It is important to relate the material of the broadcasts as closely as possible to the experience of the child. Reports from listening schools show that interest is heightened by the use of dramatized interludes. Mainly on account of the degree of human interest involved in the subject treated, it has been found that this broadcast is the most popular and most widely received of all the school broadcasts. Unfortunately, the available evidence suggests that this is almost the only form of nutrition education that the children receive, and in metropolitan schools, owing to the emphasis on the subjects which are subsequently tested by examination for grading purposes, these broadcasts are not generally received, because hygiene and nutrition are not examination subjects.

Broadcast Sessions.—Over a period of nearly eight years a fifteen-minute session entitled "Nutrition News" was broadcast by Station 4BC in Brisbane under the direction of the Queensland Nutrition Council. There have been, in all, 798 such "Nutrition News" broadcasts. The "time" on the radio was paid for by commercial interests, mainly of the type of the Committee of Direction of Fruit Marketing and the Cheese Board. They were given twice a week in the middle of the morning. Most of them were "dramatized"—that is, the educational material was presented as a dramatic episode in an endeavour to relate the factual material to the listener's experience.

Newspaper Campaigns.—Every year, from 1935 to 1939, *The Courier Mail*, the only morning newspaper in Brisbane, published a "Courier Mail Nutrition Supplement". These supplements manifested a high standard of journalism, and every article and advertisement in the supplement was passed by the Queensland Nutrition Council before publication. Most of the educational material was prepared by members of the Council. The supplements all carried an official statement by the Queensland Branch of the British Medical Association. An attempt was made in August, 1939, to arouse public interest in the result of a rat-feeding experiment. Two rats from the same litter, both male, were fed on what was described as an average civilized diet and a well-balanced diet respectively. The average civilized diet consisted of white bread and butter and jam, sausage, tomato sauce, mashed potato, tea with a little milk and much sugar, milk chocolate and milk arrowroot biscuits. The rat fed on the balanced diet was given milk, muscle meat, liver once a week, cheese, wheatmeal bread and butter, fruit, lettuce, and potatoes boiled in their skins. Details of the nutritional study were published with an indication that the application of these studies to human beings could be evaluated by the fact that a day in the life of a rat was equivalent to a month in the life of a growing child. Twice a week a graph was published showing the increase in weight. The rats, which were given the names of "Dopey Dan" and "Hector the Hero" respectively, were photographed at various stages of the experiment, and were also demonstrated publicly to school children and at the Queensland Nutrition Council's stall at the Brisbane Exhibition. The rate of growth of the animal fed on the well-balanced diet was twice the rate of the other. The better fed rat was more interested in his surroundings and had a better coat of fur.

Booklets and Wall Chart.—The Queensland Nutrition Council in 1937 issued a "Nutrition Year Book". The year book was an 88-page booklet, the cost of publication was defrayed partly by selected advertisements and partly by the sale of the booklet. The council also sold 13,000 copies of a menu planning chart.

Matriculation Subjects.—As part of the educational campaign, the University of Queensland introduced nutrition into the home science A and physiology subjects of the junior public examination. Over the period 1936 to

1940 only 3% of the candidates took home science A and only 8% physiology.⁽²⁶⁾

Social Aspects of Nutrition Education.

It is a characteristic of the outlook of a British community that it reacts promptly to an immediate danger, but hardly at all to an ever-present one. A. J. McIntyre and J. J. McIntyre expressed this viewpoint⁽²⁷⁾ when they drew attention to the active interest shown by residents of small country towns in their local hospital, with its appeal to the sense of the dramatic. This interest was contrasted with the poor interest in positive health measures, such as good sanitary conditions and a pure water or milk supply. These authors draw attention to the precarious nature of the milk supply in many country towns. Both vegetables and milk are frequently transported from producing areas close to the large cities, and this raises the retail cost. "The basis of health", they state, "is the possession of an income sufficient to buy the necessary foodstuffs." The high cost in the country districts of such essential foods as milk and vegetables more than offsets the lower cost of rent and firewood in the country.

My experience has been that there is little evidence in Australia that small communities make any effort to develop a satisfactory milk supply or vegetable-growing project. Local farm products are regarded as sources of income rather than as an essential part of the pattern of living of the community. I have yet to see a community plan for the satisfaction of the nutritional needs of a community expressed in terms of foods which are capable of being produced in the area.

Those traders engaged in providing perishable foods to the community have little sense of responsibility to the community's needs, and there is no community organization which relates their function to those of other traders and to the needs of the community in general. Indeed, scarcity is more profitable than plenty.

It is obvious that reeducation of all sections of the community by all possible channels of information is essential to obtain general approval for planning. There can be no real social progress without planning.

Nutritional Deficiencies in Australian Troops in New Guinea.

Specific hypovitaminoses, such as beriberi, pellagra and scurvy, have been uncommon in Australian white troops in the New Guinea campaign, and there have been no deaths from these causes. There were many times when, owing to operational difficulties, troops in forward areas had monotonous, ill-balanced food, poor in many nutritional factors including Calories. Under these conditions there was a slow and insidious onset of a somewhat vague syndrome characterized by a gradual diminution in the men's capacity for effort, slight dyspnoea on exertion and quite a pronounced decrease in appetite. The main complaint was of tiredness and exhaustion accompanied by a general feeling of weakness. There was a gradual development of a loss of sense of responsibility, not only towards specific military duty, but also towards the precautions which must be adopted to maintain health in tropical areas. The mountains seemed more steep, the climate seemed more exhausting, the pack seemed heavier, and meals would be missed especially after a hard day's work. There was an increasing tendency to a feeling of faintness, especially after standing up, and a complaint of a mild headache was common. Men tended to feel generally depressed.

It was not possible to relate this syndrome to any specific nutritional deficiency.

Japanese Diet and Deficiency Disease in the Pacific.

Japanese field ration scales are deficient in thiamin, vitamin A and animal protein. Ascorbic acid is almost completely absent. The official field ration scale does not contain milk or cheese. There was a small quantity of canned beef on the scale, and this was occasionally seen.

When the Japanese are taken prisoner and fed in Australian prisoner-of-war camps, they are better fed than possibly ever before in their lives. The Australian ration for Japanese prisoners-of-war includes ten ounces of meat, six ounces of milk and twelve ounces of vegetables per day.

I examined the remains of Japanese food dumps at Lae on September 28, 1943, a few days after its capture. All rice was polished, and was packed in large rubber bags, the size of a bran bag. (There have been no records of unpolished rice in Japanese food stores in the south-west Pacific area.) The thiamin content of polished rice is 0.009 milligramme per ounce, and that of unpolished rice is 0.090 milligramme per ounce. There were large blocks of compressed dried fish, and bottles of yeast tablets packed in amber glass bottles. Small vegetable farms in the area were being worked by locally captured Chinese; radishes and Chinese cabbage were being grown.

The incidence of deficiency disease amongst the Japanese in New Guinea, the Solomons and Rabaul shows the result of this feeding. Beriberi was extremely common, as would have been expected from a diet which provided less than 0.1 microgramme of thiamin per non-fat Calorie (one-third of the level necessary to prevent beriberi).

The use of various compounds of soya beans did little to affect the resulting picture, and apparently the yeast tablets were unacceptable to the Japanese troops, even if their thiamin content had remained high, which is doubtful.

Night blindness also occurred. This would be expected from a diet deficient in dairy products and animal fats. The only source of vitamin A would be the dried fish, which would provide only about seven international units per ounce to meet a daily need of 5,000 international units.

The Japanese had apparently expected to obtain much more food from the captured territories than was available. There was frequently a shortage of any kind of food. The day of armies "living on the country" is past, if there ever was such a day. The history of warfare is filled with the failures of campaigns planned along those lines.

The other lesson is that nutritional satisfaction must be planned to be provided from normal rations. Dependence on nutrient tablets and synthetic preparations is unjustified as a long-term policy. The Japanese also failed to feed adequately the natives of the occupied territories. This lost them both goodwill and the physical help which the natives could have provided as carriers and labourers.

It would seem that the Japanese nutritional clock had been put back to 1879. At that time 39% of all seamen in the Japanese navy suffered from beriberi. Polished rice and fish were then the basis of the diet, until the studies of Takaki showed (even before those of Eijkman) how beriberi could be avoided by the addition of barley, vegetables, meat and condensed milk.

The Nutrition of the New Guinea Native.

The satisfaction of the nutritional needs of the native in New Guinea has now become an integral part of administrative policy. To this end, research is in progress into the agricultural, ecological and anthropological aspects.

The practical problem of storage of brown (unpolished) rice had to be overcome to prevent a deficiency of thiamin in the native ration. Brown rice is more difficult to store than white rice, owing to the fat content of the unmilld grain, which makes it subject to rancidity. In the case of white rice, the major portion of the fat-containing part of the grain has been removed, and with it the danger of rancidity. The tendency to rancidity rapidly decreases as the grain is dried, and when it is packed in drums with a moisture content below 10% it stores well, even in tropical areas. Rice as purchased at harvest may have a moisture content up to 22%. It stores well in the unhusked form.

The New Guinea native receives a ration which provides him with 4,425 Calories, 98 grammes of protein, 0.6 gramme of calcium, 16 milligrammes of iron, 2,292 units of vitamin A, 3.0 milligrammes of thiamin, 1.1 milligrammes of riboflavin, 28 milligrammes of niacin, and 6.0 milligrammes of ascorbic acid. The nutritional deficiencies of this scale in

vitamin A and ascorbic acid are overcome by the use of ripe paw-paw as an alternative for tomato juice, and of sweet potato in place of the cereal on the basis of one pound of sweet potato to four ounces of the cereal. Provision is also made for the use of taro, bread fruit, yams or bananas as a substitute for the cereal on not more than two days a week, and a medical officer can authorize the issue of fifty milligrammes of ascorbic acid per day when an insufficient quantity of fruit or vegetables is available.

It is difficult to obtain definite evidence of the effect of this ration, which was introduced in March, 1944, but medical reports indicate that the expected improvement in health is taking place. The cost of this ration, landed in New Guinea, is 13s. 3d. per head per week.

Applying the Principles of Nutrition.

If the recommended dietary allowances are used as a yardstick, and these nutritional factors are translated into foodstuffs acceptable to the food "patterns" of the group, the satisfaction of the nutritional needs falls into four natural phases: (a) production planning and procurement; (b) storage, distribution and transport; (c) food preparation and presentation; (d) education of the consumer. These phases apply equally to the feeding of a family, a battalion, an army or a nation.

Although the carrying out of these four phases is the responsibility of services other than medical, their efficient operation requires medical supervision and coordination. The United Nations Conference on Food and Agriculture⁽²⁾ drew attention to the primary responsibility of medical and health administration in nutritional affairs.

Production Planning and Procurement.

History will regard Lord Woolton as the herald of a new epoch in the world's history—an epoch of planned production and controlled consumption. For the first time in history, food production and distribution have been geared to human needs.

The revolution in British agriculture since 1939 has had a modified parallel in Australia. One of the most serious gaps between agricultural production and human needs in Australia before the war was in vegetable production. Although one-third (150,000 of 450,000) of the pre-war rural workers in Australia have gone into the services and munition manufacture, there is now a greater production of vegetables than ever before in Australia's history.⁽³⁾ During the pre-war period 1935 to 1939 the total vegetable acreage in Australia annually averaged about 250,000; in 1943-1944 it reached an "all-time high" record of 468,000. This has been made possible in the face of manpower shortage through increased use of machinery in vegetable farming. Under the stress of war emergency, Australia, in a short space of months, has advanced twenty-five years in both vegetable production methods and processing capacity.

In Britain there was a deficiency in calcium in the diets of the lower income groups, expectant and nursing mothers and the growing child. In 1940, Lord Woolton arranged for all children aged under five years and all expectant mothers to have a pint of milk a day. This meant that farmers, although deprived of millions of tons of imported animal feed, had to meet a demand for more fresh milk than had ever been consumed before. But the milk was obtained by reducing butter and cheese production.

This is a good example of the gearing of a procurement plan to the nutritional needs of the community. There is need for a closer gearing of this kind in Australia. Milk in any form is a much superior food to butter. So is cheese; but the Australian food pattern does not readily include cheese. For this reason, intake surveys have shown that the Australian in the services tends to have an inadequate intake of riboflavin and calcium. The addition of calcium carbonate (*Creta Præparata*) to common salt at the rate of 3.8% is a useful method of increasing the calcium content of the ration.

Production of food by army organizations has developed during the past two years. In the Northern Territory and Atherton Tableland self-sufficiency in fresh vegetables has

for some periods actually been attained. Poultry and dairy farms operate. Beasts are slaughtered by army personnel. Townsville, for the first time in its history, has a large-scale chilled pasteurized milk supply from the tableland, which has been operating since 1942 for service personnel. Army bakeries, working sometimes under front-line conditions, have established a new standard of bread production. All bread baked in army bakeries contains either 40% wheatmeal or 6% wheat germ. This bread is estimated to provide 0.06 milligramme of thiamin per ounce.

Storage and Transport.

The same yardstick of nutritional values which was used in procurement becomes also the yardstick for the loading of transports, for the provisioning of a task force and for the maintenance of a balanced ration at base supply depots and forward issuing depots.

We learned some salutary lessons in New Guinea in "tropic-proofing", mould control, rust resistance, store ventilation and protection against rats. All these factors disturbed the nutritional balance of a store depot.

We had to learn how to dehydrate unpolished rice below a moisture content of 10%. Anything more than this would result in fermentation under conditions of tropical storage. It is this knowledge, perhaps more than any other single discovery, which will make possible the prevention of beriberi in the tropics.

There was an initial inertia in the field of refrigeration in the army; but development has now reached the stage at which troops over 1,000 miles from their source of supply and 200 miles from the nearest refrigeration centre can be supplied, sometimes by air transport, with fresh meat (boxed, boneless and frozen), fresh vegetables, fresh fruit and fresh wheat germ bread.

There are almost superhuman problems to be overcome in providing the individual soldier in the forward areas with a ration which not only is balanced nutritionally, but has sufficient variety to overcome the most serious cause of food deficiencies in tropical warfare—monotony.

Without conscious and sustained effort on the part of supply officers all along the thousand-mile chain of supply, the ration which finally arrives to feed the man who is doing the most arduous and most dangerous work of all—fighting in the tropics—would degenerate into meat (preserved), army biscuits, canned beans, herrings, meat and vegetable stew, tea and sugar, with perhaps some jam and condensed milk. During the early stages of a beach landing even the supply of these commodities tends to become so disorganized that a serious threat to nutrition may arise. All armies, therefore, have now developed some form of a balanced ration packed into a unit container, sufficient either to feed one man for one day or to feed a multiple of man-days. Limitations of size and weight were almost insuperable obstacles to the provision of adequate food to satisfy the needs of a man for a day. The food-weight-carrying capacity had to compete with ammunition, arms and other personal gear, which, even without food, was almost more than was humanly possible to carry.

Food Preparation and Presentation.

In the designing of ration scales, allowance must be made for the inevitable loss which takes place through all stages of the preparation, cooking, serving and consumption of the food. But unless constant and intelligent supervision over all these stages is exercised, these losses may be so serious that a definite threat to the nutritional status can arise. In the past the regimental medical officer's attitude toward food has tended to be negative—that is, he has seen that the food has not been unfit for consumption; but today the more accurate knowledge of nutritional losses makes a more positive attitude possible.

Personal inspections of units over the whole of Australia and New Guinea have shown that units having the same ration entitlement can vary within wide limits in the standard of nutritional satisfaction of the men's needs. The most important single factor determining this difference is the sense of leadership amongst the officers of the unit. By the operation of many factors within the

unit, the man can be deprived of a varying proportion of the nutritive value of his ration entitlement. These may be classified under five headings: (i) inequitable distribution within the unit; (ii) kitchen and plate wastage (examples of this are wasteful peeling of potatoes and slicing of bread); plate wastage is usually the result of serving too large helpings with poor presentation; (iii) loss of water-soluble nutrient factors by extraction in the cooking water; (iv) destruction of heat-labile nutrient factors, especially thiamin and ascorbic acid, by the heat of cooking or baking, or by the heat used in keeping food hot on completion of cooking; (v) destruction of vitamins by enzymic action, such as the oxidation of ascorbic acid by ascorbic oxidase.

Dietary Treatment in Hospitals.

There is no department of hospital activity which reflects less credit on medical science than the nutrition of the patients and nursing staff.

In the past, considerations of economy, in civilian hospitals particularly, have pressed more unfairly on the feeding costs than on any other hospital department. Food costs have been regarded more as an expensive part of the "overhead" of a hospital, rather than as an essential part of the remedial service which it is the hospital's function to provide. It is not realized that the application to hospital feeding of the modern knowledge of nutritional needs can make an important contribution to the reduction of the average length of stay of patients, and to the standard of health of those discharged.

There has been a considerable advance in the dietetic treatment of specific diseases such as diabetes, peptic ulcer, nephritis and allergy; but it has not been realized that the ordinary medical and surgical patient is in just as great a need of a diet which will satisfy his own nutritional requirements as is the patient suffering from a specific metabolic disorder. The services of dietitians have been utilized for the preparation of special diets; but they have not been used, to the extent justified by their training, in the general organization of the nutrition service of all sections of the hospital community.

The regimens of many diet manuals, moreover, have been needlessly complex, and are dominated too much by out-moded traditions and empiricism. If continued too long, some "therapeutic diets" can be positively dangerous, because the intake limitations will exhaust the patient's nutrient reserves. Some special diets are directed only toward the correction or alleviation of a particular pathological state, and they completely ignore the provision of the nutrient factors necessary for normal metabolism.

Dietetics has a traditional background that smacks of restriction, and there has been a tendency to throw out the nutritional baby with the dietetic bath water. Few patients are discharged from hospital with their attitudes toward their food habits improved.

One of the difficulties to be overcome is that the more important developments in the science of nutrition have taken place since most medical officers graduated. Post-graduate courses do not usually embrace nutrition. There is no Australian university which has a nutrition research department—such as that at the medical school of the University of Otago—or even a department of nutrition. Apart from reference to the subject in the physiology course, the subject is even today most inadequately covered in the medical student's training.

In the Australian army the problem is realized and is being solved along four lines: (i) a new system of rations for hospital patients; (ii) placement in hospitals of diet supervisors after training by army dietitians; (iii) mobile instructional teams, which visit all medical units; (iv) training of medical officers and nursing staff.

The new system of rations for hospital patients is based on three diet scales and a list of "extras". The three diet scales, with their costs based on army contract prices, are: (i) normal—1s. 11.82d.; (ii) light—2s. 8d.; (iii) fluid—1s. 6d. These scales are nutritionally adequate for the type of patient for whom they were designed. On an estimated proportion of 80% of patients receiving a normal diet, 14%

receiving a light diet and 6% receiving a fluid diet, the average cost per patient would be 2s. 0-48d.

These diet scales were drawn up under medical direction by a conference of army and Royal Australian Air Force dietitians, and the new system is estimated to save about £300,000 annually for all patients in army and Royal Australian Air Force hospitals. The scales provide a wide variety of foods. By the use of the appropriate scale, suitably modified by foods on the extra list, it is considered that any dieto-therapeutic need can be met.

The primary object of dietary treatment in hospital is to place the patient at the best nutritional advantage, so that not only are his nutritional needs satisfied, but deficiencies in nutritional reserves can be built up. A rational basis for a dietary prescription is not only the clinical examination but also the nutritional history. The Australian food pattern is such that it may be expected to have a history of an intake less than the recommended allowance in calcium, thiamin, riboflavin and ascorbic acid. Furthermore, there are certain age and income groups which are specially liable to specific deficiencies.

In general, men have a lower intake of ascorbic acid than women. The sixteen to twenty years age group, especially among males, tends to be deficient in calcium, thiamin, ascorbic acid and riboflavin. The employed female of the lower income group is one of the most serious nutritional problems. She frequently has no breakfast; her lunch is mainly refined carbohydrate bought at the corner shop. The housewife of the lower income group and the elderly single woman living by herself tend to have a diet deficient in iron, thiamin, calcium, riboflavin and ascorbic acid, to which is frequently added a protein deficiency.

The need for rapid correction of nutritional deficiencies has led to a search for substances having an unusually high content of some nutrient factor. Foods which have attracted most interest for this purpose are the following.

1. Wheat germ. When stabilized by heat treatment wheat germ has a thiamin content of about 22 microgrammes per gramme.

2. Yeast. This is difficult of acceptance by the patient. Its thiamin content is about 20 microgrammes per gramme.

3. Rose hip syrup. This is a highly acid and rather astringent food; it has an ascorbic acid content of 200 milligrammes per 100 millilitres.

4. Fruit juices. These are usually popular. Average values, in milligrammes of ascorbic acid per 100 millilitres, are: black currant syrup, 75; orange, 42; lemon, 36; pineapple, 33; tomato, 18.

Conclusion.

For the past 100 years, the developments of science and the social conscience have been leading us back to the first causes of social ills—poverty, insecurity, malnutrition, unhealthy homes, inadequate education for complete living.

"Equal opportunity" is a mockery when children start the race of life with such unequal advantages.

"The fact that there has never been enough food in the world for the health of all people is justified neither by ignorance nor harshness of nature", stated the United Nations Conference on Food and Agriculture. The statement continues as follows:

Production of food must be greatly expanded. We now have knowledge of the means by which this can be done. The basis of the satisfaction of the nutritional needs of the population of the world is the abandoning of a policy of restriction and its replacement by a policy of expansion—not only a policy of expansion of production, but an expansion of the whole world economy to provide the purchasing power to maintain an adequate diet for all. With full employment in all countries, enlarged industrial production, the absence of exploitation, an increasing flow of trade within and between countries, an orderly management of domestic and international economic equilibrium, the food which is produced can be made available to all people. Each nation can fully achieve its goal only if all work together.

I wonder if we can see the full significance of that plan. I wonder if we realize just what it means to Australia to remove economic barriers, to abolish our tariffs. This is an ideal which is going to hurt us at first, because it means that instead of being on the basis of a British economy we shall be more on a basis of an Asiatic economy. The ultimate benefits to Australia are obvious; but we shall at first realize that much of our Australian prosperity has been fictitious and selfish—stupidly so.

An intensive campaign of education will be required before mankind will have the vision and the strength of mind to make this plan possible. The people will have to see that material interests are frequently opposed to human interests. It was the preoccupation with material interests which was the prime cause of the crumbling of past civilizations.

The deepest aspiration of the peoples of the world will be for an opportunity to rebuild their own lives towards a system of stability and order. Unless they are helped in the initial steps to help themselves, this opportunity for sound reconstruction may be lost.

The fate of all United Nations' attempts to ensure banishment of these global wars may well be determined by the success of the first joint action of relief and rehabilitation administration. This is no place to discuss whether hate is necessary to win wars. But it is the place to state the conviction that hatred will lose the peace. It lost us the last one. When we win this war we shall not win rights and privileges. We shall win only the responsibility of using the knowledge of modern science to make a real peace possible. That must be our concept of the "master race". It is given to us, twice within the span of a lifetime, to attempt to devise a peace in which all men can live in freedom from fear and want. We failed last time; we dare not fail again. If we can effectively translate our concept of the brotherhood of man into terms of metric tons of grain, dried milk, meat and fats, we shall win this peace. We have the knowledge; the nutrition of large groups in this war has given us the experience; all we need now is the will.

Diet has an influence not only in health and disease; it can have a profound influence on the future of this troubled world.

Acknowledgement.

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INFECTIONS WITH PSITTACOSIS IN ADELAIDE.

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THE isolation of the virus of psittacosis from wild and pet birds in the vicinity of Adelaide has been reported by several workers (Burnet,⁽¹⁾ Meyer and Eddie⁽²⁾). During the last few years in this laboratory the virus has been isolated from the sputum of several human patients. Identification has rested on epidemiological and clinical grounds and on the presence of typical elementary bodies (L.C.L.) in the spleens of mice which died as a result of inoculation with sputum. A virus of this nature was isolated from the lung-puncture fluid of a patient who died during a small outbreak in October, 1943, in which three persons in one household were affected by acute atypical pneumonia; two of them died. In March, 1944, another case occurred in a suburb some miles distant from the first household. It has not been possible to attribute the source of infection to birds such as pigeons, domestic fowls or parrots. Altogether the "facies" of the disease as seen in these patients agreed closely with accounts of cases recorded by Favour⁽³⁾ and Meiklejohn, Beck and Eaton,⁽⁴⁾ and the laboratory investigations revealed that our cases were due to the virus of psittacosis.

CLINICAL NOTES AND EPIDEMIOLOGY.

The following are the clinical records of five cases.

CASE I.—F.N., a male patient, aged sixty-four years, was a train conductor. When he was examined at his home on October 6, he gave the following account of his illness. When

he went to work on the afternoon of October 4 he felt tired, and during the night felt he was developing an attack of influenza. He had difficulty in getting his work done efficiently owing to severe headache and general malaise. Next day he felt too ill to go on duty, and in the afternoon he had a severe chill followed by a profuse skin action. He had had malaria in German East Africa during the Boer War, and he stated that whenever he suffered from influenza he had chills and sweats.

On examination, he was lying comfortably in bed; his face was suffused, his temperature was 104° F. and some redness of his throat was present. The urine was highly coloured.

On subsequent visits he related how he had had a succession of shaking chills with most profuse sweats, severe headache, and some looseness of the bowels. Some nocturnal restlessness and delirium had occurred—he often begged his wife to be sure and wake him at Ararat. On October 9 and 10 he appeared to be much better, and when examined he was afebrile. He was next seen on the afternoon of October 12, when he was found to be extremely ill. He had a high temperature and was orthopneic and cyanosed with a violaceous tint, and both lungs were full of moist sounds. He constantly attempted to cough, but found this almost impossible owing to the urgency of his respiratory need. His wife said he had become worse during the night, and the symptoms had increased in severity during the day. He was admitted to the Royal Adelaide Hospital at 6 p.m. on October 12 and died at 1 a.m. on October 13. The cause of death was recorded as acute bronchitis.

Twelve days after the death of F.N. and eighteen days after the onset of his illness his wife became ill.

CASE II.—W.N., a female patient, was aged fifty-eight years. For three days she had felt tired and utterly worn out, when on October 24, 1943, her temperature rose from 99° F. to 104° F. in three hours. Adequate dosage of sulphapyridine was given immediately. On October 25 she was lethargic and made no complaint except that she was very tired. The temperature remained elevated between 103° F. and 102° F. She was admitted to a private hospital on October 26, and by 10 p.m. her temperature had dropped to 99° F.; next day she was afebrile, but on October 28 and 29 there was a continuous rise of temperature, and at 6 a.m. on October 30 it was 104.6° F. On October 31 pneumonic consolidation, which had been suspected earlier, was evident over the bases of both lungs posteriorly, chiefly on the left side. A specimen of blood was taken.

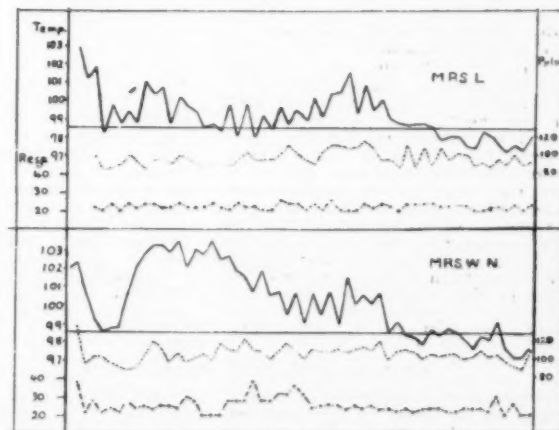


FIGURE 1A.

Two temperature charts, drawn from readings taken at 8 a.m. and 8 p.m. from two of the patients who recovered.

A white cell count on November 3 was made by Dr. Eugene McLaughlin, and his report showed that leucocytes numbered 8,350 per cubic millimetre (polymorphonuclear cells 90%, lymphocytes 6%, monocytes 3%).

During the following two weeks she was in a typhoid-like state: her temperature ranged from 103.5° F. to 102° F. in daily remissions to November 5, and thereafter gradually fell by lysis, the elevations becoming more and more intermittent until November 15 (see Figure 1A). The signs of

¹ Working with the aid of grants from the Commissioners of Charitable Funds and the University of Adelaide.

varying pneumonic consolidations went gradually and silently as they arrived. Her convalescence was slow and there was a gradual lifting of the mental hebetude. She left hospital on December 4.

Contemporaneously with the onset of the illness of W.N. her sister became ill.

CASE III.—M.T., a female patient, was aged sixty-two years. This patient's symptoms began on October 26 with symptoms of a head cold and of great fatigue. On the morning of October 28 she vomited and had some looseness of the bowels. She was found to have a temperature of 100° F., and her temperature continued to rise, until at 9 p.m. it was 105° F.; she had persistent retching, diarrhoea and distension of the abdomen.

On October 29 widespread patchy bronchopneumonia was present in both lungs; she was semiconscious and incontinent of urine and fluid faeces, and she remained in this condition until she died on November 3.

Sulphapyridine was given from October 30 onwards. On October 31 specimens of lung puncture fluid and blood were taken. On October 31 the two sisters, W.N. and M.T., were seen in consultation by Sir Trent de Crespigny, who immediately suggested the possibility that they were suffering from psittacosis, and enlisted the help of Professor E. Weston Hurst, then Director of the Institute of Medical and Veterinary Science, Adelaide.

The fourth case to be described gives no proof of having been one of primary atypical pneumonia; but as the patient was a close friend of F.N., worked in close contact with him and was ill about the same time, specimens of convalescent serum were obtained.

CASE IV.—A.J.A., a male patient, aged fifty-six years, was a train conductor. He "reported sick" with feelings of extreme fatigue and malaise on October 9, and was feverish with free skin action but no chills for about three days. Prior to going off duty he had felt unduly fatigued for several days. He was confined to bed for about a week and was absent from duty for a month.

CASE V.—Mrs. L., a widow, aged fifty-nine years, some four months later suffered from an illness bearing a general resemblance to that of W.N.

From March 19 to 24 she felt very tired, and for the two last days was disinclined to take food. On the evening of March 24 she vomited. On March 25 she felt generally ill with severe headache, and she had an elevation in temperature. She was first examined on March 27. Her temperature was 103° F., her face was flushed, she had a dry tongue, and she was apathetic. During the three nights following the patient had chills followed by profuse sweating.

On April 3 she was sent to a small private hospital. On her admission the temperature was 101.8° F., but it dropped during the following two days (see Figure 1A). On April 6 it rose again, and on the following morning there were signs of bronchopneumonia at the base of the right lung. During the following three weeks the temperature was remittent, and there were extensions of pneumonic signs to the left lung. She also complained of some cough, sleeplessness and sweating at night. Fine crepitant râles were heard at the end of inspiration over the lungs, the percussion note was impaired and expiration was high-pitched; but the typical tubular breathing and intense pectoriloquy, which are expected in acute lobar pneumonia, were lacking. Resolution of the consolidation was gradual without the usual evidences of coarse *redux* crepitations. She left hospital on May 6, but was slow in gaining strength and vigour.

Discussion of Clinical Features.

These cases are reported in order that appropriate investigations of blood or lung-puncture fluid may be undertaken in the early days of an acute illness appearing to fall within the category of the acute primary atypical pneumonias, or in the later stages of such infections, that serological titrations may be made.

In the recognition of the possibility that such a virus infection may be the responsible factor in the causation of acute primary pneumonia, the following point may be emphasised. From the clinical notes it will be seen that after an acute onset in three of these cases there was a fall in temperature with amelioration of symptoms, generally succeeded by an abrupt secondary rise, which apparently coincided with the manifestation of bronchopneumonic consolidation (see Figure 1B).

There was no evidence to suggest that parrots played a part in the aetiology, although there were two parrots in the N. household. They had been there for many years in a cage and were fed and cared for by W.N. One of these parrots was examined at the institute and found to be free of active virus infection; the other parrot escaped, but was reported to be in excellent health.

The two persons outside this household who gave positive serological evidence of the same psittacosis-like virus infection had had no contact with parrots or close contact with any other kind of bird, so that the theory that a comparatively recent fixation of such a virus has been developed in man, and that person to person communication may occur, must be entertained. The possibility also exists that a human infection may be latent and capable of producing acute illness when transmitted by a carrier to a susceptible person.

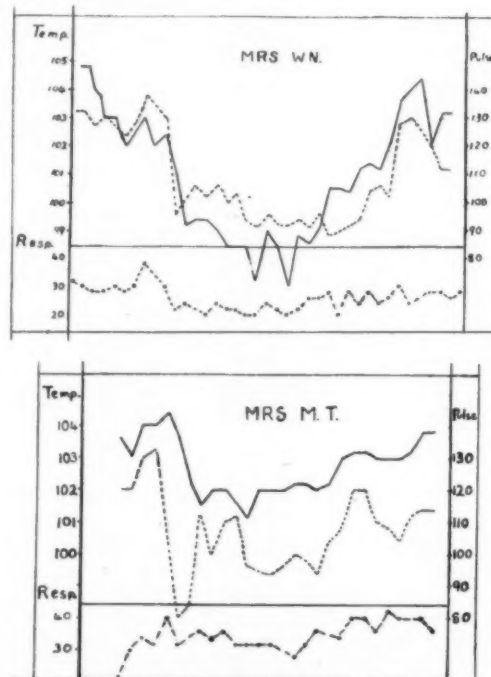


FIGURE 1B.

Two charts drawn from four-hourly readings to show the primary high temperature, the fall and then the secondary rise.

LABORATORY WORK.

Methods.

The examination for the virus was carried out as follows.

Specimens of blood and lung-puncture fluid from humans were tested for the presence of aerobic and anaerobic bacteria. If sterile they were inoculated on to chorio-allantoic membranes of nine to eleven day developing chick embryos and into young mice by the intracerebral and intraperitoneal routes. Serial passages were made from suitable organs emulsified in a 10% solution of normal horse serum in saline solution. Impressions of organs and smears from centrifuged deposits of embryonic fluids were stained by Castaneda's method and examined for elementary and inclusion bodies.

The parrot was investigated as follows. The bird was killed and examined for macroscopic lesions; a piece of liver and the spleen were emulsified and inoculated intraperitoneally into mice. Two further serial intraperitoneal passages were made and spleen impressions were examined.

Pathogenicity Tests.

Mice.—"Standard suspensions", made by emulsifying one lung (± 0.49 gramme) after intranasal inoculation, one brain (± 0.35 gramme) after intracerebral inoculation, and one spleen (± 0.25 gramme) after intraperitoneal inoculation, in five millilitres of 10% normal horse serum in saline solution, were used throughout. The size of the inoculum was as follows: intraperitoneal, 0.5 millilitre; intracerebral, 0.05 millilitre; and intranasal, 0.05 millilitre. In titrations of virus serial tenfold dilutions of "standard suspensions" were made in ice-cold normal horse serum in saline solution, and each dilution was inoculated into three or four mice.

To detect a carrier stage in the virus infection of mice the method of Beck *et alii*⁽⁶⁾ was used. Mice which survived an intraperitoneal inoculation were killed on the twenty-first day and their spleens and livers were tested for the presence of virus by intracerebral inoculation into mice.

Embryos.—Chorio-allantoic membranes were harvested in five to seven days, and a "standard suspension" was made by emulsifying one membrane (± 0.3 gramme) in five millilitres of normal horse serum in saline solution. Impressions were made from the ectodermal surface by Burnet's method.⁽⁷⁾ Eleven to twelve day embryos were inoculated amniotically, and amniotic and allantoic fluids were harvested in five to seven days. The deposits from the centrifuged fluids and from the tracheal fluid (obtained by the method of Burnet and Foley⁽⁸⁾) were examined for elementary bodies. Nine to ten day embryos were inoculated suballantoically by Burnet and Beveridge's method,⁽⁹⁾ and the allantoic fluid was harvested in six days. In titrations serial dilutions of embryonic fluids were made in the same way as from the "standard suspensions", and six eggs were inoculated with each dilution.

Virus Strains.—For purposes of comparison a strain "Blount" of psittacosis was sent to us by Dr. S. E. Williams, from the Walter and Eliza Hall Institute of Research in Pathology and Medicine, where it had been isolated from a human some years ago.

Immunity Tests.

Mice were immunized by two or three intraperitoneal injections of a 10^{-3} or 10^{-4} dilution (approximately one to ten average intraperitoneal lethal doses) of an active "standard suspension" of infected mouse spleen or brain at intervals of one week. About ten days after the last injection the challenging dose of undiluted "standard suspension" (approximately 10,000 to 100,000 average intracerebral lethal doses) was given; three methods of testing their immunity were tried—namely, intranasal (Rudd and Burnet⁽¹⁰⁾), intraperitoneal and intracerebral (Beck *et alii*⁽⁶⁾) inoculation.

Serological Tests.

The complement fixation test was employed.

Antigens.—"Mouse antigens" were made from infected mouse spleen by Bedson's method.⁽¹¹⁾ "Egg antigens" were at first made from infected chorio-allantoic membranes, but later, acting on a suggestion from Dr. S. E. Williams, we used infected allantoic fluids, which proved more satisfactory. Embryos are inoculated suballantoically on the ninth day and the fluids are harvested five days later. Control antigens from uninoculated mice and eggs were made by the same methods. All were preserved by the addition of a 0.25% phenol solution.

Serum.—Convalescent serum was available from three patients. One specimen of serum (L.G.I.) from a patient convalescent from *lymphogranuloma inguinale* was sent to us by Dr. S. E. Williams; in his laboratory it fixed complement in the presence of Blount and Towler strains. Three specimens of normal adult serum were used as controls. Four rabbits were immunized by seven or eight weekly intravenous injections of one millilitre of standard suspensions of active virus, as detailed in Table II. Serum was collected three weeks after the last injection, and serum from a rabbit immunized against *herpes simplex* virus was used as a control. All serum samples were held at 56° C. for thirty minutes and stored at 4° C.

Method.—Two minimum hæmolytic doses of complement, calculated from a titration in the presence of the antigens, were used in all tests; 0.2 millilitre of serum dilution, 0.2 millilitre of undiluted antigen and 0.2 millilitre of complement (two minimum hæmolytic doses) were stood in a bath at 37° C. for one hour, then 0.2 millilitre of sensitized erythrocytes (five minimum hæmolytic doses of hæmolyisin and 3% sheep erythrocytes) were added and the result of the test was read after a further thirty minutes in the bath.

*Results.**Examination for Virus.*

The specimen of blood and lung fluid from M.T. and of blood from W.N. were free from bacteria. No virus was isolated from the specimens of blood. The lung fluid produced lesions similar to those of psittacosis on two out of three chorio-allantoic membranes, killed three out of six mice inoculated intracerebrally, and caused peritonitis and enlarged spleen with L.C.L. bodies in three of the six mice inoculated intraperitoneally and killed when apparently healthy on the seventh day. This virus strain was called "Towler".

No virus was detected in mice inoculated with material from the parrot.

Pathogenicity Tests.

Mice.—Intracerebral inoculation of "Towler" strain killed mice between the third and seventeenth days, with signs of cerebral irritation preceding death. Impression smears from infected brains showed typical intracellular and extracellular L.C.L. bodies. When "standard brain suspensions" were titrated in young mice there was approximately one average lethal dose in a 10^{-6} dilution of "Blount" strain and more than one average lethal dose in a 10^{-5} dilution of "Towler". Intraperitoneal inoculation of a "standard spleen suspension" nearly always killed mice between the fourth and thirtieth days. Post-mortem examination revealed peritonitis with enlarged dark spleens, and in some of the mice surviving for ten days as much as four or five millilitres of turbid peritoneal fluid containing polymorphonuclear and mononuclear cells. "Standard spleen suspension" was titrated intraperitoneally in young mice and one average lethal dose was found present in 10^{-4} dilution.

In order to determine whether "Towler" virus produced a latent infection when a non-lethal dose was injected intraperitoneally, the livers and spleen of mice surviving for twenty-one days were emulsified and inoculated intracerebrally into four mice. The mice died with typical signs on the fourth and fifth days and their brains were found to be sterile when culture of bacteria was attempted.

Intranasal inoculation of standard brain, lung or spleen suspensions killed about 50% of the mice between the third and sixth days, with the production of small grey areas of consolidation in the lungs. A titration of lungs from the first lung passage was attempted as described by Rudd and Burnet,⁽¹⁰⁾ but the lesions proved too difficult to count for accurate quantitative work. Probably further lung passage would be necessary before we could reproduce their consistent counts. A 10^{-4} dilution of a "standard lung suspension" of "Towler" strain produced lung lesions, whereas a 10^{-5} dilution did not.

Although elementary bodies resembling L.C.L. bodies were present in impressions and smears of organs from infected mice, the large intracellular plaques were not seen in mice killed on the third to eighth days after inoculation. Bedson⁽¹²⁾ has described these to be early forms which alternate with the elementary bodies in a regular sequence in the life cycle of psittacosis virus.

Eggs.—Inoculation on to the chorio-allantoic membrane produced lesions typical of psittacosis in five to six days. Impressions showed L.C.L. bodies in and around the cells. The embryos were not killed. Inoculation into the amniotic sac gave rise to those signs described by Burnet and Foley.⁽⁸⁾ Smears of the tracheal fluid deposits contained many extracellular L.C.L. bodies, and a few leucocytes and epithelial cells, some of the last-mentioned containing L.C.L. bodies. Examination of impression smears from lungs and livers of infected embryos also revealed the elementary bodies.

Allantoic fluid infected with "Towler" strain was titrated in eleven-day embryos by amniotic inoculation. Only one of two embryos inoculated with 10^{-6} dilution was infected, and none of the three inoculated with 10^{-8} ; lower dilutions infected and killed most of the embryos. Suballantoic inoculation produced the signs described by Williams,⁽¹²⁾ and death usually occurred on the sixth day. A 10^{-6} dilution of allantoic fluid infected two of three embryos; lower dilutions infected all embryos.

Immunity Tests with "Blount" and "Towler" Strains.

It is known that mice carry psittacosis in liver and spleen for several months after intraperitoneal inoculation; hence our method of vaccination undoubtedly depends upon the establishment of an infection immunity. Unfortunately the final number of immunized mice was small, because many died during the process of immunization.

The results of these tests are presented in Table I; because we found the lung lesions difficult to count, this method proved unsatisfactory; the groups in the first test are too small to be significant; but in the second and third tests we were able to immunize mice against intracerebral inoculations of "Towler" or "Blount" strains to some degree (decrease in percentage mortality and/or delayed death). We were also able to demonstrate cross-immunity between the two viruses.

Serological Tests.

Antigens prepared from chorio-allantoic membranes and from allantoic fluids gave similar results. The simplest antigen to prepare is, of course, infected allantoic fluid, and by titration of the complement with this antigen allowance is made for its complement-enhancing effect.⁽¹⁴⁾⁽¹⁵⁾ The results are presented in Table II. The tests with rabbit antiserum show that "Towler" strain was a stronger antigen than "Blount", but otherwise there appears to be little difference in their antigenic make-up. We hoped that this antiserum would be useful in identifying viruses isolated from other cases, and it is probable that it will be, provided egg antigens are used. We were unable to explain the reactions obtained in several different tests between R.T.E. and R.B.E. sera and normal mouse antigens.

W.N. and A.J.A. both had a high serum titre against "Towler" virus three weeks and six weeks respectively after infection, whereas about five weeks later their titres had fallen. This fact convinced us that the virus isolated from M.T. was responsible for their illness and presumably for that of M.T. Three and a half weeks after her illness L. was found to have a titre, which we considered of diagnostic import, against "Towler" strain. All these specimens of serum gave fixation with "Blount" virus also, but they differentiated between the two strains to a greater extent than did the specimens of artificially prepared rabbit serum.

Discussion of Laboratory Work.

No virus was detected in the blood from M.T. and W.N. taken on the fifth and seventh days of illness respectively. This is in accordance with Burnet's experience⁽¹⁶⁾ that blood is infective only during the first three days of human psittacosis. The lung fluid of M.T. contained a virus which infected mice and eggs and produced elementary bodies similar to the L.C.L. bodies of psittacosis. We decided that this virus was the cause of the human infections because it fixed complement in the presence of serum from the three convalescent patients, but not in the presence of normal adult serum.

The clinical evidence and the appearance of the elementary bodies suggested that "Towler" virus belonged to the "psittacosis-L.G.I." group of viruses. The fact that the early stages in the life cycle of psittacosis virus were not seen in tissues infected with "Towler" virus did not seem significant when we were also unable to find them in tissues infected with "Blount" virus. The results of the complement-fixation test proved that the virus belonged to this group, but this test does not distinguish between viruses within the group and thus reveal the source of infection.

Beck *et alii*⁽¹⁶⁾ divided into three groups the psittacosis-like viruses causing atypical pneumonia in man, mainly according to their pathogenicity to mice. Table III is adapted from their table with the addition of "Towler" virus. On this method of differentiation our virus is a strain of psittacosis virus, and the result of our cross-immunity tests in mice, when compared with theirs, is in accordance with this classification.

TABLE I.
Immunity Tests in Mice.

Test Number.	Immunizing Virus.	Route of Administration of Challenge Virus.	With Challenging Injection of Towler Virus.		With Challenging Injection of Blount Virus.	
			Number Tested.	Percentage Mortality.	Number Tested.	Percentage Mortality.
I	Towler	Intraperitoneal.	14	50 (20) ¹	14	50 (18)
	None		5	100 (18)	5	20
II	Towler	Intracerebral.	10	70 (10)	11	72 (13)
	None		13	100 (5)	12	100 (5)
III	Towler	Intracerebral.	12	100 (7)	10	30 (9)
	Blount		15	40 (9)	14	14 (5)
	None		17	100 (4)	17	100 (5)

¹ The figures in parentheses denote the average day of death of those mice which died during the observation period (40 days in test I, 28 days in tests II and III), following the challenging injection.

TABLE II.
Results of the Complement Fixation Test: Human Serum.

Serum.	Days after Illness.	Mouse Antigens.			Allantoic Fluid Antigens.		
		"Blount."	"Towler."	Control.	"Blount."	"Towler."	Control.
W.N. I	18	10 ³	80	— ²	10	20	—
W.N. II	47	8	64	—	10	10	—
A.J.A. I	40	16	24	—	40	40	—
A.J.A. II	67	8	24	—	8	12	—
L.	24	5	64	—	4	4	—
L.G.I.	—	—	24	—	5	5	—
Controls	—	—	—	—	—	—	—

² Only the denomination of the serum titre is recorded, and all titres refer to the initial serum dilution.

³ The sign "—" indicates that there was no fixation with a 1:4 dilution of serum.

TABLE II.
Results of Complement Fixation Test: Rabbit Antiserum.

Serum.	Immunized Against.	Mouse Antigens.			Allantoic Fluid Antigens.		
		"Blount."	"Tower."	Control.	"Blount."	"Tower."	Control.
R.T.E.	"Tower" (chorio-allantoic membrane) ..	40 ¹	100	40	160	200	10
R.B.E.	"Blount" (chorio-allantoic membrane) ..	80	80	60	160	180	10
R.T.M.	"Tower" (mouse brain) ..	80	120	60	80	160	—
R.B.M.	"Blount" (mouse brain) ..	80	60	40	80	80	—
R.H.R.	Herpes (rabbit brain) ..	— ²	—	—	—	—	—

¹ Only the denomination of the serum titre is recorded, and all titres refer to the initial serum dilutions.

² The sign "—" indicates that there was no fixation with 1/10 dilution of the serum.

TABLE III.
Classification of Psittacosis-like Viruses causing Atypical Pneumonia in Man.¹

Virus.	Origin.	Pathogenicity to Mice.			Immunizes Mice Against ²
		Intranasal Injection.	Intracerebral Injection.	Intraperitoneal Injection.	
Ornithosis	Pigeon.	+	+	±, C.	Psittacosis, ornithosis, S-F and meningo-pneumonitis.
Meningo-pneumonitis .. .	Ferret.	+	+	±, C.	Psittacosis, ornithosis, S-F and meningo-pneumonitis.
Psittacosis .. .	Parrots <i>et cetera</i> .	+	+	±, C.	Psittacosis, S-F and "Tower".
S-F .. .	Human.	+	+	O., N., C.	S-F.
Towler .. .	Human.	+	+	±, C.	Psittacosis and "Tower".

¹ "+" = generally fatal; "±" = occasionally fatal; "O" = never fatal; "C" = carrier stage; "N.C." = no carrier stage.

² Immunizing doses by intraperitoneal injection, challenge inoculum by intracerebral injection.

³ Strain S-F was isolated in 1940 from two fatal cases of atypical pneumonia.⁽¹⁷⁾

Unfortunately serological tests were not made on the parrot, but because psittacosis virus was not isolated from the organs it seems unlikely that this bird was the source of infection of the four cases in October.

Because of the absence of any evidence of an avian source of virus in both the October and March cases we hesitated to call the virus that of psittacosis; however, we consider the results of the pathogenicity tests in mice to be of more significance and have classified our strain as a psittacosis virus. Although we realize that it is impossible to eliminate brief contacts, unrecognized by the patient, with birds, not one of our patients had come into intimate contact with a sick bird, as is usually the case in the transmission of psittacosis from bird to man.

SUMMARY.

In this short series the varying types of this psittacosis-like disease are exemplified—namely, the typhoid type, the acute fulminating type, the paludal type with shaking chills, and probably an abortive milder type. Our experience shows that person to person communicability of the virus results in severe and at times fatal infections.

A virus morphologically resembling that of psittacosis was isolated from lung-puncture fluid of a patient who died from atypical pneumonia. This virus fixed complement in the presence of convalescent serum from three recovered patients, but not in the presence of normal serum.

By serological, immunity and pathogenicity tests the newly isolated virus was proved to be a strain of psittacosis virus.

ACKNOWLEDGEMENTS.

We are greatly indebted to Professor E. Weston Hurst, who allocated the laboratory investigation to us and under whose guidance the earlier work was done. Our thanks are also due to Sir Trent Champion de Crespigny and to Professor E. R. Trethewie for helpful criticism of the manuscript, and to Dr. S. E. Williams for his advice on the laboratory tests.

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APPENDIX.

Since this paper was prepared another case of psittacosis has occurred.

J.M.J., a female patient, aged thirty-one years, was a typist. From October 9, 1944, she felt tired and exhausted until October 13, when she had a high temperature and chills; she complained of feeling alternately hot and cold, and had severe sweats. She could not look at food, but was very thirsty. On the

afternoon of October 15 she was better, but during that night was first cold and then hot, had to be propped up in bed gasping for breath, and had a short frequent cough with right-sided upper abdominal pain.

She was first examined on October 18 and sent to a private hospital. At the first examination her temperature was 103° F., her respirations numbered 26 per minute, and her pulse rate was 100 per minute. A frequent distressing cough was present, and fine crackling râles were heard at the base of the right lung posteriorly.

On October 19 she was radiologically examined by Dr. B. S. Hanson; the examination revealed a patchy consolidation in the lower fields of both lungs, apparently of lobar distribution, but without complete involvement of the lower lobes; a more discrete circular shadow in the left mid-zone suggested the presence of an interlobular collection, but this was thought to be unlikely, and was held to be probably further evidence of pneumonic consolidation.

During the next fortnight the illness continued with varying lung signs of bronchopneumonic consolidations and resolutions, with some free actions of the skin, anorexia and moderately elevated temperature. The mental state was quiet and untroubled.

From November 6 she was afebrile, and her convalescence was uninterrupted.

The infection in this instance appears to have been a direct one from sick parrots. Mr. J. breeds parrots in flight aviaries almost completely occupying the small back premises of his garden. Early in September he obtained 31 young parrots from Sydney. By October 10, ten only remained alive, and of these three were obviously ill. These three were killed and examined. Subsequently the remaining seven died. The large aviary in which these parrots were caged was close to the back of the house, where J.M.J. would naturally spend a great deal of her time when at home.

There is a striking resemblance between the symptoms and course of the illness in this case of psittacosis by direct contact with infected parrots and those of cases described in the paper; this further justifies the diagnosis psittacosis on clinical grounds in these earlier cases. It is considered that the picture of psittacosis thus portrayed should lead to a recognition of this disease, which is probably not uncommon, seeing that so many instances have occurred in one individual practice at widespread points in the southern suburbs of Adelaide.

On October 20 lung-puncture fluid and venous blood samples were obtained; a further serum sample was obtained in November. No virus or bacteria were isolated from the lung fluid. Both serum samples fixed complement in the presence of the psittacosis virus isolated from the patient's parrot, the second sample to a higher titre than the first. When it is taken into consideration that the lung fluid and the first serum sample were taken several days after the height of the disease, the above findings indicate that the virus of psittacosis caused the pneumonia.

The virus of psittacosis was isolated from only one of three parrots examined. This virus killed mice when inoculated intraperitoneally, but detailed work has not yet been done.

ON THE SYSTEMIC ADMINISTRATION OF PENICILLIN.

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On the properties of and indications for administration of penicillin enough has been written and proved to convince the most obstinate "doubting Thomas". There is, however, by no means unanimity as to the most advantageous method by which penicillin should be given. In this brief paper we would describe but two methods of systemic administration which have proved successful in our hands.

We have been impressed by the mental and physical suffering caused by three-hourly intramuscular injections of the drug and by the distress caused to patients treated in this way. Such a patient may have been wounded and left unattended for several hours. After this he may have been subjected to operation, to numerous blood transfusions and to other injections of various types. As Bentley⁽¹⁾ remarks, it is difficult to persuade some to accept what Professor Garrod has described as "the price of success".

We therefore concentrated on the perfection of intravenous penicillin therapy and overcame the tendency to thrombosis or thrombophlebitis in the recipient's vein by the addition of heparin, four units per cubic centimetre of penicillin solution, as described by one of us (Martin⁽²⁾).

We have used a dosage of 120,000 Oxford units of penicillin per litre of saline solution per day, with the addition of four cubic centimetres (4,000 units) of heparin, the heparin being mixed with the penicillin solution prior to the commencement of the drip administration. It is important that the rate of drip is even, so that in each hour 5,000 units of penicillin are given. A scale alongside the reservoir, with the time marked in hours, renders the control of the drip rate almost foolproof (Figure I).

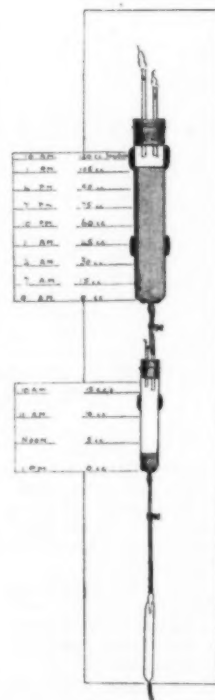


FIGURE I.

The apparatus (Figure II) as designed was found to be similar to the "Eudrip" apparatus described by I. W. J. McAdam and others,⁽³⁾ although the dosage is slightly different. It has been made for us by Messrs. Elliotts and Australian Drug, Proprietary, Limited, of Sydney. It consists of an upper narrow cylindrical reservoir, which has a capacity of 120 cubic centimetres. This is connected by "Latex" rubber tubing to a smaller reservoir, which has a capacity of 15 cubic centimetres, and the connecting tube is controlled by a screw clamp. Connected to the smaller reservoir are the ordinary drip tubing and feed sight, which is controlled by another screw clamp. It is important that "Latex" rubber shall be used throughout, as there is evidence that ordinary red rubber tubing inactivates penicillin.

Both reservoirs are closed by two-hole rubber stoppers—one hole for the feed and the other for the air inlet—both of which are made of glass tubing. The air inlet tubes are filled loosely with cotton wool to act as a bacterial filter. On the large reservoir a covering of "Latex" rubber might be preferable, and the penicillin solution could then be injected by an intravenous needle, the air inlet and outlet being provided by another needle inserted through the "Latex" covering.

The apparatus is mounted on a wooden stand, the reservoirs being held by means of spring clips, which allow of easy and rapid attachment after sterilization.

The large reservoir is graduated from 0 to 120 cubic centimetres and the smaller tube from 0 to 15 cubic centimetres. A detachable time scale is affixed to the board, indicating at what particular hour of the day each level of the solution should be reached. This is done in order to minimize error and in order that the rate of administration may be controlled at a glance.

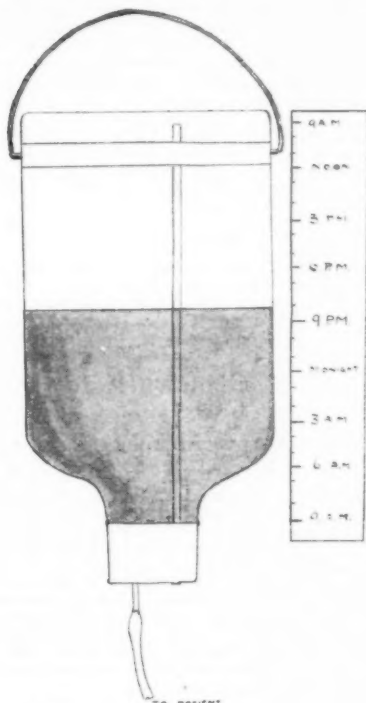


FIGURE II.

Three-inch saline solution needles are used for insertion into the muscle. The *modus operandi* is simple. The penicillin solution is made up to 1,000 Oxford units per cubic centimetre, and 120 cubic centimetres of this solution are put in the upper large reservoir. This represents a day's dose of penicillin. Fifteen cubic centimetres are run into the lower small reservoir, and this is the three-hourly dose. The needle is inserted into the front of the *vastus lateralis*, pointing proximally, and the drip is regulated to five cubic centimetres per hour. It should be understood that no attempt is made to regulate the drip so that five cubic centimetres last an hour, but when five cubic centimetres have been given the drip is closed off until the hour is completed. At the end of three hours the small reservoir is refilled by running in a further 15 cubic centimetres from the large reservoir. The large reservoir is refilled from a stock bottle kept in the refrigerator.

It has been found in practice that at the end of four days the penicillin solution tends to run back along the needle track; in this case the needle must then be moved to the opposite *vastus lateralis*. It is thought that this may be due to thrombosis of the smaller vessels around the needle, and it is proposed to try the effect of heparin in the obviation of this minor fault.

It is admitted that this apparatus requires hourly attention day and night; but the reward for this is a certain knowledge that the patient is receiving his correct dose, evenly distributed, that he is free from pain, discomfort and undue restriction, and that he is spared the torture

of three-hourly intramuscular injections. Incidentally, the surgeon can rest assured that he will not be called to deal with a stopped drip due to thrombosis of a vein.

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Reports of Cases.

A CASE OF LACERATED SPLEEN RESULTING FROM AN UNUSUAL ACCIDENT.

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THE recording of the following case has been prompted mainly because of the unusual nature of the accident; but three other clinical facts, which unfold themselves below, are worthy of note.

Clinical Record.

J.H.B., a healthy petty officer, aged twenty-nine years, was admitted to the naval section of the Prince of Wales Hospital, Randwick, with the history that he had been involved in an accident in the Petty Officers' Club at a naval depot in Sydney. Whilst playing billiards in the late afternoon of March 8, 1945, he altered his score on the marker; then, as he turned away, a large picture frame happened to fall from its position on the wall and struck him on the head. He states that he "saw a few stars", but was not knocked over. At the same instant he felt a sharp pain in his left side, which radiated to his left shoulder and down into his left iliac fossa. He was helped to a bench and subsequently carried to the sick bay, where a sharp triangular piece of glass, about two and three-quarter inches long and half an inch wide at the base, was removed from the postero-lateral aspect of his chest wall at the level of the tenth intercostal space. The piece of glass was protruding slightly from the chest wall, and the puncture resulting was the only sign of injury. He was placed under observation in the sick bay, the wound being dressed with a pad soaked in acriflavine. He continued to complain of pain in the left shoulder and the left hypochondrium until 9.30 p.m., when it was noticed that his pulse and respiration rates commenced to rise and that he was suffering from shock; there were no other objective signs.

He was admitted to the naval section of the Prince of Wales Hospital at 1.30 a.m. on March 9. On examination, he was very pale, and his oral and conjunctival mucous membrane was colourless. He was lying still in bed, but was uneasy in demeanour. He was suffering from obvious air hunger, and his mental processes were retarded. His pulse rate was 140 per minute; the pulse was regular, but weak and thready. His systolic blood pressure was equivalent to 55 millimetres of mercury, but the diastolic pressure could not be adequately estimated. The puncture wound in the position indicated above was inspected; there was no external bleeding, and no surgical emphysema was present. His abdomen was not distended, and no masses were palpable, nor was there any rigidity or muscle guarding. Vague tenderness was elicited in all areas of the abdomen, and dullness to percussion was present in both flanks. The eliciting of areas of shifting dullness was not attempted. Palpation of the abdomen gave a sensation similar to palpating a half-full canvas water-bag.

A provisional diagnosis of puncture of the spleen was made.

Considerable difficulty was experienced in initiating intravenous therapy, because as a child the patient had had all the commonly employed superficial veins interfered with, and considerable scarring of the skin, when being treated for some severe debilitating disease, possibly malaria. This fact, together with the state of extreme collapse, was rather time-consuming in the search for a suitable vein.

The management of the patient will be given in chronological order. At 2.30 a.m. the intravenous drip administration of a 5% solution of dextrose in normal saline solution was commenced, about 100 mls being run in while the apparatus was adjusted and secured. At 2.45 a.m. the transfusion of pooled human serum was commenced, about 300 mls being used. At 3.30 a.m. the transfusion of the first flask (860 mls) of group O (IV) blood from the Red Cross Blood Bank was started. At 6.30 a.m. the administration of the second flask (860 mls) of group O (IV) blood was commenced. At 8 a.m. an X-ray examination of the abdomen was made to exclude the presence of a foreign body, and an X-ray examination of the thorax was also made to exclude hemothorax or pneumothorax; neither revealed any abnormality.

At 9 a.m. the patient was transferred to the operating theatre with the intravenous drip transfusion of blood still running. At 9.30 a.m. the transfusion of the third flask (860 mls) of group O (IV) blood was commenced.

At 10 a.m. operation was commenced by the Consulting Surgeon to the Navy (Dr. George Bell), anaesthesia being induced with ether given by the "open" method. Through a left paramedian incision extending from the costal margin to two inches below the umbilicus the abdomen was cleared as far as possible of blood clot and splenectomy was performed. It was found that the piece of glass had pierced the lower fibres of the diaphragm and the body of the spleen, and that the point had lacerated several vessels at the hilum of the spleen. The abdominal cavity contained a large amount of blood clot and fluid blood. Bleeding was still occurring from the hilar vessels, but not from the substance of the spleen, which had contracted to minimal dimensions. At 11.30 a.m. the transfusion of the fourth flask (860 mls) of group O (IV) blood was commenced. At 12 noon the operation was completed.

At 2 p.m. the administration of a flask of dextrose (5%) in normal saline solution was commenced, at the rate of 30 drops per minute.

On March 10, at 1 a.m., the administration of another flask of dextrose (5%) in normal saline solution was commenced at the rate of 30 drops per minute. Intravenous drip therapy with alternate flasks of dextrose (5%) in normal saline solution and normal saline solution was continued until March 12, when the patient's general condition had improved sufficiently for him to take fluid by mouth.

At 9 a.m. his general condition was satisfactory. He complained of some "tightness" of the abdomen. His colour was good. His pulse rate was 110 per minute; the volume and tension of the pulse were good. He had passed 83 ounces of urine since his operation. At 10 p.m. he complained of more discomfort in the abdomen, especially in the epigastrium, which had been temporarily relieved during the afternoon by the vomiting of 20 ounces of dark brown fluid. His respiration was upper thoracic in type. His colour was good; but the pulse rate had risen to 130 per minute, and the volume and tension of the pulse were less than during the morning. His abdomen was distended in the sub-costal angle, but there was no tenderness or rigidity. There was diminished air entry at the bases of both lungs. It was considered that he was approaching a state of acute dilatation of the stomach. A small Ryle's tube was passed via the nose, and continuous gastric suction by the Wangenstein method was instituted.

With the withdrawal of large quantities of brownish fluid during the next forty-eight hours his condition improved steadily until March 13, when all special treatment was stopped. By this time he was capable of taking his nourishment by mouth. Unfortunately the special charts recording the exact quantity of fluid withdrawn are not available.

The patient was finally discharged from hospital for three weeks' sick leave on April 18; at the end of this time it was considered he was fit was full duty.

Comment.

Apart from the unusual nature of this accident, it was considered that three other aspects were worth recording: (i) the large quantity of blood and pooled serum given intravenously; (ii) the early institution of continuous gastric suction for incipient acute dilatation of the stomach; (iii) the unusual sensation on palpation of the abdominal wall.

As has been recorded above, four and a half litres of blood and pooled serum were given in eleven and a half hours following the patient's admission to hospital, the last four hours of this period being the time taken for the operation and the immediate post-operative period. In cases such as these it must be realized that a quantity of blood of the order of the total circulating volume of blood is required,

and that to perform a long and difficult operation in the upper half of the abdomen before such time as the circulating blood volume has been largely replenished is only courting disaster.

The writer, when a junior house surgeon, saw a patient die from acute dilatation of the stomach following splenectomy for traumatic rupture, when early appreciation of the situation could have avoided the disaster. It is thought that, in such a case as this, in which the abdomen has been filled with blood and adynamic ileus of the alimentary tract is to be expected, and in which also handling of the stomach cannot be avoided, dilatation of the stomach should be anticipated and continuous gastric suction instituted as soon as passage of the Ryle's tube is possible. The healthy tone of the stomach can then be a good starting point for the return of normal peristalsis to the small bowel.

The finding of an abdominal wall with no tenderness or muscle guarding when the abdomen is full of a fluid which normally causes such a reaction is worthy of note. The writer had noticed this phenomenon previously in cases in which extreme collapse has been present as well. This fact is important, in that the unwary clinician may misinterpret the findings and assume that because there is no reaction of the abdominal wall, no irritant fluid is present.

Summary.

1. The management of a case of lacerated spleen is described.
2. Three clinical facts of interest and importance are emphasized.

Reviews.

TRAUMA AND DISEASE.

"TRAUMA IN INTERNAL DISEASES", by Dr. Rudolf A. Stern, assisting attending physician, City Hospital, New York City, is a book which should be in the possession of every medical man who is called upon to give medical testimony in accident or war compensation cases.¹

At present it is often difficult to obtain authoritative information on this subject without a search through a score of periodicals and text-books, and, in many cases, the works required are not available. In this book the author has made an exhaustive survey of evidence of the effects of trauma on all types of internal disease, and to the average reader he makes some astounding revelations.

It is not difficult, for instance, to believe that a blow on the thorax or on the abdomen without obvious injury to the skin or muscle could cause serious injury to the heart, lungs or abdominal viscera, but the average intelligent practitioner would scoff at the idea that appendicitis could be brought about in such a way. He will be prepared to state dogmatically that it may possibly aggravate a preexisting pathological state, but it would be impossible to initiate an inflammatory state in such a tiny organ which is so well protected and freely mobile in the abdominal cavity. Dr. Stern, on the other hand, quotes numerous authoritative instances with autopsy findings of direct trauma to the appendix, sometimes with fatal results. He also shows that no one can be dogmatic in stating that trauma never plays an initiating role even in such pathological conditions as endocarditis, *thrombo-angitis obliterans* or Banti's syndrome, and in putting forward his evidence he quotes no fewer than 1,949 authorities.

While Dr. Stern perhaps overstates the importance of trauma, he does not recognize sufficiently the neurotic factors associated with it; even regarding dyspepsia he states "dyspepsia nervosa once a favourite diagnosis has become more or less a clinical rarity". Few gastro-enterologists will agree with this statement.

Today it is difficult for insurance companies or repatriation departments to win their cases of appeal, but with this book in the hands of the appellant's advocate it will become even more difficult, for he will be able to cite sufficient authenticated evidence to convince most courts on the validity of his client's claim, however unreasonable it may appear to be.

¹ "Trauma in Internal Diseases with Consideration of Experimental Pathology and Medico-legal Aspects", by Rudolf A. Stern, M.D.; with foreword by Francis Carter Wood, M.D., 1945. New York: Grune and Stratton. 9" x 6", pp. 599. Price: \$6.75.

The Medical Journal of Australia

SATURDAY, JULY 28, 1945.

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THE ADELAIDE HILLS INVESTIGATION.

FROM time to time during the last few years passing reference has been made in this journal to the investigation that was being carried out, and for that matter is still being carried out, into the health of children living in the hills district surrounding Adelaide. An interim report of the findings was drawn up about twelve months ago for the National Health and Medical Research Council, and since that time the work has been continued. The work itself is so interesting and its significance is so great that it should be brought in some detail to the notice of readers. Early in 1939 ten medical practitioners of the Adelaide hills district formed the opinion that a systematic investigation into the health of the children living in the area would be of value. Dr. C. C. Jungfer, acting as their spokesman, suggested that the study should be made. The idea was that the investigation should cover a period of five years and that an essential part of the work should be an annual medical examination of each child. The ten general practitioners offered to conduct these examinations in an honorary capacity. In May, 1939, the National Health and Medical Research Council approved of the five-year plan and agreed to provide a grant to meet the expenses incidental to such a survey (nursing and clinical assistance and so on). Under terms of the council's grant an advisory committee was appointed consisting of Dr. F. S. Hone (chairman), Sir Stanton Hicks and Dr. A. R. Southwood. The average cost of the inquiry over a period of five years has been £911 *per annum*. The survey began in January, 1940, but before then war had broken out; in spite of this it was possible to continue the work for five years. In the first year the ten practitioners were able to conduct the investigation as originally planned; at the end of that time three of the ten had gone on active service and four of the others were doing periods of duty in

military camps. The National Health and Medical Research Council came to the rescue towards the end of 1941 and increased the grant so that outside medical help could be obtained to conduct the medical examinations. The findings discussed in the interim report are mainly those of the first two years of the survey; this is important because no proof is needed to substantiate the claim that the approach adopted is that of the family doctor, who naturally pays attention to the family environment. The latter part of the report deals with the health needs of the children living in the area. The area of the survey is part of the central subdivision of South Australia and covers 428,540 acres; it is divided into both range and undulating country. The people, who are estimated to number 20,000, are almost entirely engaged in primary industries. In the area are 46 schools described as "village schools" and the unit chosen for the administration of the survey was the region served by any one school. The importance of this study is obvious because there are many areas in Australia comparable with the Adelaide hills district. Dr. C. C. Jungfer, who is the author of the interim report, points out that there is a commonly held belief that in a pleasant and fertile countryside, whose people are free from economic hardships, the child population must be healthy. His report shows that this is not necessarily true.

An important fact must be borne in mind in the assessment of the health of the people of this area—the area possesses fewer of the amenities of communal life than other more recently settled districts in South Australia. This inadequacy extends to hospital facilities and proper sanitation. It is thought possibly to be due to the migration from the undulating section of the hills district of the more robust, mentally alert and adventurous types of younger persons. The weaker child, we are told, is the one likely to remain in the safer home environment; the majority of those who have left have become successful farmers in their new environment. The position is different in regard to the part of the area described as the ranges. Problems associated with the migration of the young, the robust and the imaginative, are, of course, not confined to the hills district of Adelaide. When all the information in this report is taken by and large, it does not seem that the factor of migration has had any pronounced effect on the health of the children. The families were found to be distributed fairly evenly throughout the area, and the large majority of them were Australian in status. The families were not large—84% of the 3,578 children came from homes with one to three children. The incidence of goitre in the area was found to be high; a history of rheumatic fever in some member of the family was given in 26% of the families; and the incidence of tuberculosis as shown by the family histories was low. Among the first steps of the investigation were the taking of a census of children between the ages of one and fourteen years and the distribution and collection of history circulars. The initial response in the return of history circulars was 78%—a most satisfactory result.

The disabilities found among the children are classified for the sake of convenience into two groups; in the first are conditions which may be fairly rapidly corrected by active measures, and in the second those which can be dealt with only by a long-term public health programme. The first group includes visual defects due to errors of refraction and those requiring surgical intervention, such

as diseased tonsils, hernia and dental caries. The findings in regard to vision are interesting. At the first clinical examination it was found that 156 children (4.3%) had some visual defect and 51 of them had treatment. A child's success at school at the present time is largely dependent on his ability to see, and everyone will agree with the contention that while it may not be necessary for all of the 91 children who have received no treatment to wear glasses, they should at least be examined by an ophthalmologist. The idea that children in the country with visual defects should visit ophthalmologists in the city is ridiculous. The work can be done quite well by a travelling ophthalmologist. Someone will be bound to remark that this work is done in all States by the medical officers of the education departments. We agree that these officers should do the work, but medical branches of education departments are so understaffed that they can do only a fraction of the work that they are supposed to undertake. After the war, we are given to understand, matters will be different, but that remains to be seen. The incidence of tonsillar disease was found to be greatest between the ages of six and nine years, and the number of children who had had their tonsils removed increased rapidly among children from six to ten years of age. While it is stated that the majority of children receive early attention for tonsillar disease, the incidence of tonsillectomy does not reach the proportions reported by writers in other countries. This is thought to be due to a conservative attitude adopted towards tonsillectomy by the practitioners of the district. Untreated dental caries is very prevalent among children of the area. During the hundred years in which this area has been settled, dental treatment has been given chiefly by travelling dentists. This means that what is known as blood and vulcanite dentistry prevails—there is no time for conservative work. This aspect is a most important part of the problem presented by the children in the Adelaide hills, but it is also part of the dental problem of all Australian country people, many more of whom will be edentulous if a way out is not found. An example of what can be done is provided by the army, which has set up highly efficient mobile units for the treatment of its personnel. The second group of conditions mentioned in the report is stated to include malnutrition, poor postural states and orthopaedic conditions. The findings in regard to malnutrition are perhaps the most interesting of all those stated by Dr. Jungfer. The children in the Adelaide hills "live under excellent climatic and economic conditions"; but the word economic must be used here in a restricted sense—it does not cover the question of work by children. There is no lack of available food and real poverty does not exist. At the same time the amount of malnutrition is the same in this area as in the metropolitan area of Sydney or in inland parts of the Commonwealth. This is curious. The reason does not seem to lie in lack of food. This point was investigated in the case of a special group, in which it was found that the difficulty lay in making the children eat food of the proper kind. The fault lay with the mother, who knew what was needed and was quite willing to do what was best for the child. We are told that the mother had an imperfect understanding of the principles of child psychology and guidance. Dr. Jungfer has some sound views on this subject, but he and those who are working with him are severely handicapped by the conditions under

which the children have to grow and adolescence. He holds that the problems of malnutrition and the other conditions in this second group need for their solution a programme which is long and often tedious. Infant welfare clinics in which the Adelaide hills district is deficient are part of this programme. Dr. Jungfer thinks that when the old "gamp" type of nurse passed out of existence, there also went much of the confidence and competence of mothers in their dealing with problems of child welfare. The excellent suggestion is made that the infant welfare nurse should be a member of the hospital obstetric staff so that she might have the closest possible contact with the mother from the birth of the child onwards. Other matters mentioned are the provision of nurseries or pre-school facilities and the provision of a school midday meal with civilized facilities for eating it. "Until the ordinary decencies of life are provided by the school, it is difficult to start programmes for better nutrition." The unfavourable conditions mentioned are those associated with work on dairy farms. The children of the dairying districts work throughout the year. They are expected to help in the cow yard both before and after school hours. In this regard it is interesting to note that the boys of the undulating country show a higher incidence of malnutrition than do those of the ranges. We are told that children living on dairy farms have an almost universal dislike for milk. This is thought to be partly due to the primitive and often insanitary methods of milking. The abundance of milk is thought not to be entirely responsible for the aversion, and in support of this view, it is stated that there is no antipathy of the children of the ranges for fruit, of which they have plenty. The children therefore present a problem which is partly psychological and partly the result of physical fatigue. It is reasonable to suppose that this problem of the child must be solved before organizations such as infant and child welfare clinics and schemes to give a sound psychological outlook to mothers will be effective. An intensive study of 120 children suffering from malnutrition was made. The cause of their malnutrition could not be determined. Three suggestions are made to help in the discovery of the cause. The first is that a more detailed investigation should be continued over a period of years. The second is that a group of seriously malnourished children should be investigated while in residence at a holiday home—here all the factors, biochemical and psychological, could be studied. The third is that an educational programme for mothers should be instituted so that their intelligent cooperation might be obtained.

Dr. Jungfer and his associates think that hope for the future rests largely in a closer association between doctors and educationalists. With this object some of the newer plans in rural education are reviewed. This is an enormous subject and its discussion must be left for a future occasion. It must suffice to state that pre-school child centres are mentioned and that area schools such as those in existence in Tasmania are discussed. In conclusion, everyone connected with child health and child welfare will do well to study the interim report prepared by Dr. Jungfer. It represents one of the finest pieces of voluntary work in preventive medicine that has been undertaken in the Commonwealth of Australia. Further reports from the practitioners in the Adelaide hills will be awaited with more than usual eagerness.

Current Comment.

THE LATE EFFECTS OF CEREBRAL BIRTH INJURIES.

THE cerebral injuries sustained by the infant at the time of its birth have been studied by many authors. An interesting example will be found in a comprehensive article on intracranial hæmorrhage in the newborn by W. S. Craig in Volume XIII of *Archives of Disease in Childhood*, 1938, at page 89. Craig reviews an extensive literature on the subject from the pathological point of view and discusses pathological and clinical findings in 126 cases of his own. Among those interested in this subject is C. E. Benda. In an article published in 1943 he "produced evidence that in the idiot group [of mental defectives] about 50% are due to congenital manifestations, but 30 to 35% do depend on vascular lesions developing at the time of birth". Benda has now published a study of the late effects of cerebral birth injuries,¹ at the outset of which he quotes a statement, made by F. R. Ford in 1926, that in regard to the late effects of birth injuries little exact information is available and the greatest difference of opinion exists. Benda holds that it is still true that there is no general agreement among neuropathologists about the late pathological anatomy of intracranial hæmorrhages. Kinnier Wilson in his book on neurology admits the frequency of cerebral hæmorrhages at the time of birth and refers to the controversial problem of the extent to which they are responsible for hemiplegic or diplegic sequelæ among infants who survive. According to Wilson, some writers hold that the significance of these hæmorrhages is overrated and that the cause of the disability is to be found rather in arrested development or in antenatal disease of some kind or other. Wilson refers to a complete contradiction offered in findings recorded by Rydberg. This observer followed the subsequent histories of 48 infants who manifested hæmorrhagic cerebral symptoms during the first week of life. No less than 16 of the 48 infants showed extreme mental defect and some had spastic palsies as well. According to Benda many persons seem to believe that a child injured at birth will either die or recover completely. This idea is entirely incorrect, and his paper should therefore be given prominence.

Benda refers to the difficulty that must be experienced in attempts to differentiate congenital malformations from the effects of birth injuries. In order to obtain satisfactory information about the latter, all cases of congenital injury have to be excluded from any study that is made, even if sequelæ of a birth injury are found in addition to the congenital malformation. In view of the difficulty in the determination many years after birth of a birth injury as a factor in the causation of abnormalities, Benda's criteria in the selection of material must be stated. The hereditary criteria used by him were two in number—all patients had normal parents and a "negative" family history; and all children had normal siblings and were the only mentally deficient members of the family, except for those few with no siblings. There were two clinical criteria. First of all, physical examination of the children revealed no malformations or developmental disorders which would suggest a prenatal disturbance. Secondly, examination at the time of birth revealed no abnormality and no signs of microcephaly were present at the time. The first of the two pathological criteria was that the central nervous system appeared on examination to be mature and no signs of prenatal developmental disorder were found. The second criterion was that the character of the lesions was such as to indicate that they were either the consequence of vascular incidents and depended in their distribution upon vascular patterns, or were caused by extrinsic agents which produced patchy devastation, while the unaffected tissue was essentially normal. By applying these criteria Benda found material which conformed to them in 24 of 130 autopsies of mentally defective children of various types.

The lesions found by Benda in his twenty-four cases are divided by him into three groups, comprising respectively mantle sclerosis, cystic degeneration of the brain and patchy devastation. Mantle sclerosis is also known as granular or parchment atrophy of the brain, subcortical encephalomalacia and subcortical porencephaly. It was present in five cases of Benda's series. Benda states that the lesion in the brain consists of a degeneration of the cortical layers with necrosis of the subcortical white matter. Over the defect of the cortex the leptomeninges are thickened. Although the process starts with the traumatic destruction of cortical tissue, the condition is progressive owing to the fact that scar formation and leptomeningeal fibrosis lead to interference with the venous drainage and absorption of spinal fluid. Mantle sclerosis may occur in older persons after thrombosis or in cerebral arteriosclerosis. In infancy it is seen in congenital syphilis and in equine and other types of encephalitis, but the majority of cases are due to vascular birth injuries. Cystic degeneration of the brain was present in three of the twenty-four cases. This condition is characterized by the formation of cystic cavities in the central white matter. The cysts are formed outside the basal ganglia and communicate with the ventricular system only after large parts of the central white matter have been destroyed. Benda points out that the lesions are not related to any particular vascular patterns, but seem to depend on ischaemic necrosis. "It is still a matter of argument whether long lasting asphyxiation at birth can alone produce the ischaemic necrosis in the white matter." The histories in Benda's series recorded long-lasting asphyxiation during birth, and he suggests that asphyxiation with anæmic necrosis is the most important factor in the pathogenesis of the condition. In sixteen of Benda's series diffuse patchy devastation was present. He states that this condition has not yet been described as an entity resulting from birth injuries; it has not been thoroughly understood. The condition is characterized by diffuse patchy devastation of the cortical layers, vasoparetic cortical congestion, leptomeningeal fibrosis, brain atrophy with enlargement of the lateral ventricles and areas of central necrosis and demyelination. A connexion has been shown between the lesions and the vein of Galen, and Benda states that the course of this vein renders it vulnerable to stasis, retrograde congestion and tearing. As a result hæmorrhages occur in the region of the tributaries of the internal cerebral veins, especially the terminal veins and the veins along the thalamus and caudate nucleus. The hæmorrhages lead to subependymal necrosis with consequent enlargement of the lateral ventricles and atrophy of the basal ganglia. The lesions in the sixteen cases suggested that they had their origin in venous hæmorrhages, vasoparetic stasis and anoxia. Benda holds that in babies and infants a difficult birth is the main factor in the production of the combination of anoxia and trauma which cause the condition.

When birth injuries are discussed it must be remembered that the infant may be affected in all kinds of birth. As Benda puts it, it is not the type of birth but several contributory factors which facilitate the occurrence of cerebral hæmorrhages. In his experience the most important factors are prematurity, breech presentation and long-lasting labour before delivery. The most important aspect for emphasis is naturally the prevention of trauma. Next comes the diagnosis of cerebral damage at the time of birth. Benda holds that this can be made in most cases immediately after birth. This appeared in a retrospective study of his cases. In most of the remaining cases the possibility of cerebral damage was indicated a few weeks after birth; in only a few cases could the diagnosis not have been made until several months had elapsed. Epileptic seizures were of foremost value as diagnostic signs in Benda's series, and neurological disorders of the motor and sensory type ranked second. It may be, as Benda suggests, that neurosurgical intervention will be effective in some cases. But apart from treatment, the recognition of a child's mentally retarded state as due to trauma and not to maldevelopment may be of enormous psychological value to husband and wife, and indeed to other members of a family.

¹ *Medicine*, February, 1945.

Abstracts from Medical Literature.

THERAPEUTICS.

The Production of Lesions in Rats Fed with Sulphaguanidine in Purified Diets.

P. GROSSE, A. E. AXELROD AND M. D. BOSSE (*The American Journal of the Medical Sciences*, November, 1944) state that profound disturbances, similar in many respects to those observed in vitamin deficiency syndromes, are produced by the administration of sulphaguanidine to growing rats receiving a highly purified diet. They have observed the lesions produced in rats during the course of sulphaguanidine administration and their evolution and involution under therapy. They have found that rats, maintained on a purified basal diet to which has been added 0.5% or 1% sulphaguanidine, show severe symptoms and pathological changes which become maximal after two months of drug ingestion and terminate fatally in about 90% of the cases. The drugged animals show deceleration and cessation of growth and a debilitated general condition. Terminally shock becomes manifest. The signs of this condition are apathy, diminution in body temperature, flaccidity of skin and muscles, failure of cut veins to bleed and increased viscosity of the blood with increased tendency to clot. The pathological changes include: progressive hypoplasia of the bone marrow which may attain the state of aplasia; degenerative and necrotizing hepatic lesions; focal necrosis and lymphoid exhaustion of the spleen; hyperplasia and mobilization of endothelial cells in the liver, spleen and lungs; hyperplasia of the thyroid gland; occasional minute foci of myocardial degeneration and necrosis with cellular infiltration; urolithiasis with the complications secondary to urinary obstruction and nephrosis. The administration of liver or "folic acid" concentrate plus biotin to animals suffering from sulphaguanidine effects reduced the mortality rate from 90% to 14%. Under the influence of this therapy the liver and splenic lesions tended to disappear or to heal and the bone marrow became hyperplastic. The hyperplastic state of the thyroid remained unaffected, except by the administration of thyroxine. The experimentally demonstrated curative action of liver and "folic acid" concentrate plus biotin on the toxic effects of sulphaguanidine suggests the clinical trial of these preparations as prophylactic agents against certain of the toxic effects of sulphonamides. Widespread clinical use of liver or "folic acid" concentrate in sulphonamide therapy must await clinical investigation of the question whether these substances interfere with the effectiveness of the sulphonamides.

Penicillin Given by Mouth with Egg.

C. J. H. LITTLE AND G. LUMB (*The Lancet*, February 17, 1945), in view of the experimental finding that penicillin undergoes a "stabilizing" change during passage through the body, that is to

say, becomes more resistant to heat and to alterations of pH, have mixed penicillin with raw egg and find that the admixture induces a stabilizing change of the same kind. When volunteers were given a dose of alkali followed by penicillin in egg by the mouth, the bacteriostatic activity of their blood rose to satisfactory levels.

Tetanus.

R. BUXTON AND R. KURMAN (*The Journal of the American Medical Association*, January 6, 1945) report two cases of tetanus in which the patients were treated with penicillin. In one case lockjaw came on gradually over a period of five days before treatment was started. There was no history of a wound, but a wound ten days old was found in the sole of the foot. Twenty thousand units of tetanus antitoxin were given intramuscularly and 80,000 units intravenously. Twenty thousand units of penicillin were given every three hours for two days; the administration was omitted on one day by mistake and then resumed, 10,000 units being given every three hours for nine days. Sulphadiazine was given every three or four hours in doses of one gramme for five days at first. Tetanus antitoxin was repeated on the second, the ninth, the fifteenth, the sixteenth, the eighteenth and the twentieth day. Seconal, sodium bromide and chloral hydrate were given as sedatives and later tribromoethanol was given *per rectum*. Rigidity was pronounced until the eighteenth day, but recovery was complete. The other case was that of a boy, aged nine years, in whom symptoms supervened four days after he stuck a piece of wood into his great toe. Rigidity with opisthotonus occurred by the fourth day. Similar treatment was carried out, 80,000 units of antitoxin being administered in four days, and 360,000 units of penicillin in six days. The boy recovered.

Vincent's Angina.

VINCENT'S organisms occur normally in the mouth, and a diagnosis of angina should not be made unless the patient has a sore throat, fever, membrane in the throat or tonsil, a tonsillar ulcer and a smear showing numerous fusiform bacilli and *Borrelia*. Arsenicals and bismuth are not reliable in treatment. In a series of 48 cases reported by W. W. Manson and I. T. Craig (*The Journal of the American Medical Association*, February 3, 1945), treatment consisted of dissolving a 0.5 gramme sulphathiazole tablet on the tongue every two hours in the day and two tablets every four hours at night for seventy-two hours. Clinically all patients responded rapidly and were symptom-free in seventy-two hours. Seriously ill patients received eighteen grammes and those with milder infections twelve grammes of sulphathiazole. Average sick days for these patients were 3.75, whereas formerly ten days was the usual period of incapacity.

Penicillin.

C. G. HARFORD, S. P. MARTIN, P. O. HAGEMAN AND W. B. WOOD (*The Journal of the American Medical Association*, February 3, 1945) describe the treatment of staphylococcal infections with penicillin. According to the severity of the symptoms, from 5,000 to 40,000 units are injected every one to four

hours in concentrations of 5 to 20,000 units per millilitre. Intrapleural injections of 5 to 20,000 units were given every twenty-four hours when the pleura was infected. In meningitis 20,000 units in two millilitres of isotonic saline solution were given intrathecally every day. Patients with staphylococcal bacteraemia, carbuncle, endocarditis, pneumonia, furunculosis, pericarditis and osteomyelitis were treated. In general, results were good. Pneumococcal infections included nine cases of meningitis in which one patient died. In empyema results were inconclusive in two cases out of three, since drainage was necessary in these two instances.

Deficiency Diseases.

H. C. HOU (*The Chinese Medical Journal*, January-March, 1944) discusses prevention and treatment of common nutritional deficiency diseases in Shanghai. Beriberi and keratomalacia, signs of vitamin A deficiency, were found to affect 16% of all patients at a refugee clinic in Shanghai in 1937-1938, and in the same hospital 30% of the in-patients suffered from one or other of these deficiency disorders. Riboflavin deficiency was noted in nearly 50% of the patients among children, among students and coolies. The vitamin requirements of adults are 3,000 to 5,000 international units of vitamin A, 1.0 to 1.5 milligrammes or 300 to 500 international units of vitamin B₁, two milligrammes of riboflavin (vitamin B₂), 15 to 20 milligrammes of nicotinic acid, 40 to 60 milligrammes or 800 to 1,200 international units of ascorbic acid (vitamin C). In China these vitamins are derived from soybean, rice polishings, liver, alfalfa and amaranth. Sorghum and maize are also mentioned. For prevention, nutrition clinics are suggested in order to educate the people and to diagnose and treat the deficiencies. When deficiency disease has occurred, an adequate diet of 3,000 to 4,000 Calories, balanced in protein, minerals and vitamins, is advised. High vitamin dosage is needed. For beriberi intravenous and intramuscular administration of vitamin B₁, 10 to 1,000 milligrammes daily, may be necessary at the beginning, if symptoms are severe. Vitamin A, or its precursor carotene, is present in high concentration in alfalfa, turnip leaves, amaranth and sweet potato, the main natural sources in China. Pellagra treated orally requires 300 to 500 milligrammes of nicotinic acid daily; it may be given parenterally or intravenously in quantities up to 80 milligrammes a day. Pig's liver, rice polishings, whole wheat and beef are good sources. For scurvy, 200 to 500 milligrammes of vitamin C daily and orange, turnip or other vegetable juice are needed. Ariboflavinosis requires three to five milligrammes of riboflavin daily. Pig and ox liver, fish roe and yeast are good sources. Nutritional oedema due to lack of protein is treated by oral ingestion of protein. Multiple deficiencies occur frequently. Natural foods are the main basis of treatment.

Penicillin and Gonorrhoea.

L. E. PUTNAM, H. WELCH AND S. OLANSKY (*The Journal of the American Medical Association*, January 27, 1945) discuss the treatment of gonorrhoea

with seven salts of penicillin. Thirty-five patients with sulphonamide-resistant gonorrhoea were treated with various salts of penicillin, that is, calcium, magnesium, sodium, strontium, potassium, lithium and ammonium salts. Five patients were treated with each salt, which was injected intramuscularly in doses of 25,000 units in five millilitres of isotonic saline solution at three hourly intervals; four doses were given in all. Injections were given into the buttock, deltoid and triceps areas. Those given into the buttock were the least painful. Only one penicillin preparation (penicillin ammonium) caused severe pain. All patients were cured, as shown by failure to grow cultures of gonococci after one, three and five days.

NEUROLOGY AND PSYCHIATRY.

Organic Psychoses Simulating Dementia Praecox.

PHILIP POLATIN, VICTOR EISENSTEIN AND S. EUGENE BARRERA (*The Psychiatric Quarterly*, July, 1944) present in detail the histories of two patients confined for long periods in mental institutions as sufferers from *dementia praecox* before further investigation proved them to be suffering from organic disease of the brain. In the second case the schizophrenic syndrome had apparently persisted for over twenty years before the organic cerebral trouble was recognized. The electroencephalogram revealed slow wave patterns in both cases. Investigation under "Sodium Amytal" revealed memory defects. Pneumoencephalograms disclosed cerebral atrophy; and the result of the Rorschach test suggested an organic brain disease. In both patients biopsy studies revealed the pressure of degenerative cerebral changes. As the younger of these patients showed a lasting improvement following electroconvulsive therapy, the authors suggest the application of such treatment in the case of early pre-senile psychosis.

Electroencephalographic and Neurological Studies of Homosexuals.

FIFTY-FIVE male homosexuals were selected for study by Daniel Silverman and William R. Rosanoff (*The Journal of Nervous and Mental Disease*, April, 1945). Nineteen of these were rated as of average intelligence, twenty-eight were superior and eight inferior. The average age of the group was twenty-five to twenty-nine years. Neuro-pathic heredity was present in 41.8% of the cases. Of the entire group of subjects, 70.9% had had an illness or an injury which might have involved the central nervous system, or had neurological signs indicating a pathological condition of the central nervous system. Both positive neuropathic histories and neurological findings were present in 29.1% of the cases. The neurological findings included inequality of the deep reflexes, inequality and irregularity of the pupils, incoordination, speech defects, atrophies and deformities, tremor *et cetera*. Pathological or borderline variant electroencephalograms were obtained in 75% of the cases, leading the authors to the conclusion that an inherited or

early acquired abnormality of the central nervous system played a contributory role in the development of homosexuality. Two case histories are presented in detail together with the electroencephalographic tracings.

The Psychiatric Problem of Suicide.

A GENERAL discussion on the subject of suicide among mental patients is presented by James H. Wall (*The American Journal of Psychiatry*, November, 1944). This is based upon the histories of 33 patients, the majority of whom were suffering from the manic-depressive psychoses. The writer believes the following to be the warning signs of suicide: (i) depression with ideas of guilt, self-depreciation and self-accusations associated with tension and agitation; (ii) severe hypochondriasis; (iii) insomnia with great concern about it; (iv) fear of losing control, of hurting others or oneself; (v) previous attempts to injure oneself; (vi) suicidal preoccupation and talk. The author believes that with the advent of electric shock therapy, depressed patients are more easily and quickly cured, and there are, therefore, fewer cases of suicide; but he gives a timely warning against too early relaxation of customary vigilance of the recovering melancholic.

Hemiballismus.

HAROLD KELMAN (*The Journal of Nervous and Mental Disease*, April, 1945) presents two cases of hemiballismus—a syndrome characterized by violent, uncontrollable, purposeless throwing movements of one upper extremity or of the entire half of the body. In some cases the homolateral side is less severely affected. The lesions in the *corpus Luysi* are mainly due to hemorrhages, softenings or emboli, but may be due to toxins and degenerative conditions. Two cases are clinically described. The patients were seamen of fifty-six and sixty-six years of age respectively. Both patients died and were subjected to post-mortem examination. In the body of the elder patient there was evidence of gross cerebral arteriosclerosis, and in that of the younger, a primary carcinoma of the lung with a metastatic nodule above the left cerebral peduncle between the *substantia nigra* and the *corpus Luysi* was found. The entire question of hemiballismus is discussed both historically and clinically; and certain similarities and differences between the cases presented and those in the literature are mentioned.

Persistence of Symptoms in the Psychoneurotic Ex-Soldier.

DALLAS PRATT (*The Journal of Nervous and Mental Disease*, April, 1945) has undertaken an analysis of 142 replies to questionnaires from psychoneurotic ex-soldiers. The first result is evidence of the persistence of neurotic symptoms after discharge from the army. When improvement was reported, it was assigned to such factors as the achievement of independence, quiet, being home, having a job or living in the country. Included in the factors blamed for the persistence of neurotic symptoms were such factors as lack of freedom, unsuitable employment and feelings of guilt. A long discussion is presented on the subject of causation of the neuroses of war and their persistence in civil life,

with emphasis on guilt feelings, marital disharmony and the soldier's inability to be reabsorbed into the civilian group. A solution to the problem is suggested in an endeavour to reintegrate the ex-soldier in the community by utilization of his training in group living.

Different Forms of Diffuse Sclerotic Process in One Family.

MAX KASTAN (*The Journal of Nervous and Mental Disease*, April, 1945) presents histories of four members of the same family who showed different forms of a diffuse sclerotic process. The first patient's condition was misdiagnosed as a case of multiple sclerosis. Two sons—the first and third children—died from organic brain disease. The father, six sisters and two brothers were not affected. Maternal uncles and aunts were excessively alcoholic. Neurological disquisition is interspersed between detailed clinical presentation. The author concludes with the suggestion that familial spastic paralysis should be classified as the apical type of diffuse sclerosis.

Shock Treatment in Psychopathic Personality.

ACCORDING to Harry F. Darling (*The Journal of Mental Science*, March, 1945), there is a poverty of information regarding the treatment of psychopathic personality. He therefore gives his findings in three such cases, in which electric convulsion treatment was used. The first patient who displayed many psychoneurotic symptoms did not respond. The second patient who showed depressive phases appeared to respond and was discharged from hospital and has remained well. The third patient, who appears clinically to have suffered from a typical psychopathic personality, also appeared to achieve a good response to electro-convulsion therapy. No conclusions are drawn from the treatment of these three patients; but the author confesses to a personal change of viewpoint from pessimism to optimism.

Definition of Psychopathic Personality.

No definition, according to Harry F. Darling (*The Journal of Nervous and Mental Disease*, February, 1945), of psychopathic personality satisfies the specific requirement of a disease. Definitions found in the literature are incomplete and variable. Aetiological opinions are conflicting, varying from developmental abnormality to early emotional deprivation. The author tabulates the definitions of fourteen accredited psychiatrists in regard to onset, aetiology, psychopathology, symptomatology and prognosis. He comments on these, both individually and collectively. He finally concludes that psychopathic personality is a disorder which develops before or during puberty and is caused by inherited predisposition, or by some acquired personality deviation due to somatic or psychic factors which cause super-ego deficiency. The disorder, he states, is characterized by "deviations in the moral, social, sexual and emotional components of the personality without intellectual impairment, psychosis or neurosis, with lack of normal insight and ability to profit by experience, and is of life-long duration in almost all cases."

Public Health.

THE OCCURRENCE OF CONGENITAL DEFECTS IN CHILDREN FOLLOWING MATERNAL RUBELLA DURING PREGNANCY.

The following report of a committee appointed by the Director-General of Public Health of New South Wales to investigate the occurrence of congenital defects in children following maternal rubella during pregnancy, has been received for publication from the Director-General of Health, Commonwealth Department of Health.

Introduction.

In August, 1944, the Director-General of Public Health, New South Wales, appointed a committee to investigate congenital defects following maternal rubella during pregnancy. The committee comprised Dr. N. McA. Gregg, Dr. D. Vickery, Dr. M. Heseltine, Dr. W. Ramsay Beavis and Dr. E. Meyers. At a later date, Dr. A. E. Machin accepted appointment to the committee.

It was desired that the committee should furnish a report, with appropriate recommendations concerning the above matter, under the following headings: (i) the effects of rubella on the pregnant woman, the embryo and the child; (ii) the prevention and treatment of rubella in the pregnant woman; (iii) any other aspects of the problem. Notification of cases of congenital defects with a history of maternal rubella during pregnancy was sought from medical practitioners by means of a notice inserted in the monthly circular to members of the British Medical Association (New South Wales Branch). The cooperation of hospitals in this respect was also sought. In a large number of cases, nurses of the Department of Public Health obtained the histories; in others, the medical practitioner or the hospital forwarded them to the committee.

It will be appreciated that in seeking notifications of congenital defects in this manner, only "positive" cases would be recorded and those cases where there was a history of maternal rubella during pregnancy and where the child was born normal would not be notified. To remedy this, the committee recently recommended to the Director-General that medical practitioners and hospitals be circularized and asked to notify to the committee in future all cases where a pregnant woman contracts an exanthem. This recommendation has been accepted and medical practitioners and hospitals have been circularized accordingly.

Number of Cases Recorded.

One hundred and eighty cases of children suffering from congenital defects have been recorded. Histories have been received for 148 of these cases, of which 130 reveal a history of maternal exanthem during pregnancy. In the remaining 18 cases for which histories have been obtained, the occurrence of exanthem during pregnancy is denied.

In addition to the above, there have been recorded six cases in which the mother suffered from rubella during pregnancy, but the children are apparently normal in all respects.

The 32 cases of children suffering from congenital defects, for which histories have not been received, according to the information supplied, appear to belong clinically to the group under investigation.

Of the above cases, it is known that at least 116 women contracted rubella during 1940, an epidemic year in New South Wales for the disease. In addition, Gregg has recorded 68 women who contracted rubella during the period December, 1939, to January, 1941, and whose children were born with congenital eye defects. Notification to the committee of cases has been voluntary and it is thought that a number of cases has not yet been notified. It is possible also that a number of miscarriages, stillbirths and deaths of young children occurred as a result of maternal rubella during the early months of pregnancy. Among Gregg's cases there were fifteen deaths in the first year of life.

Also, there may have been other women in addition to the six cases recorded who were attacked by the infection during pregnancy and gave birth subsequently to normal children.

Thus, it is impossible to estimate the total number of women affected and the mortality and morbidity figures of children born to these women, but the facts quoted are indicative that the number and figures must be greater than possibly first considered.

Following the receipt of the above histories, the committee decided to inaugurate a series of clinics to examine a number of children to determine the nature and extent of the congenital defects and also to determine, if possible, the future possibilities of the children with particular reference to educability.

Analysis of 136 Histories of Children, with a History of Maternal Exanthem during Pregnancy.

Geographical Distribution of Maternal Infection.

From the information available, all maternal infections, except in four cases, occurred in New South Wales and were scattered widely throughout the metropolitan and rural areas.

In the four exceptions, the infections took place in New Guinea (two cases), Queensland and Victoria.

Annual Incidence of Maternal Infection.

The annual incidence of the maternal infection was shown in Table I.

TABLE I.

Year.	Number of Cases.
1923	1
1937	4
1938	1
1939	1
1940	116
1941	5
1942	8
Total ..	136

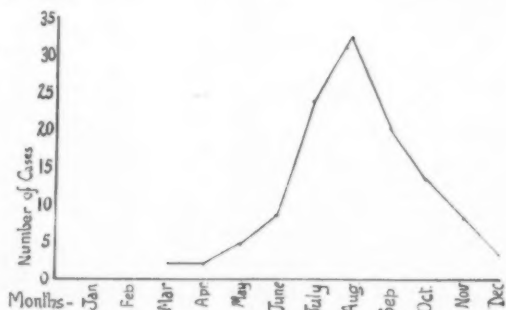
For purposes of comparison, the number of cases of rubella occurring in the years 1933 to 1943 in school children as notified to the Department of Education, New South Wales, is given in Table II.

TABLE II.

Year.	Number of Cases.
1933	300
1934	200
1935	150
1936	1,000
1937	4,683
1938	546
1939	1,166
1940	30,228
1941	499
1942	3,320
1943	743

Rubella is not a notifiable disease under the *Public Health Act* of New South Wales.

The following graph shows the monthly incidence of the maternal infection in 116 cases, which occurred during the year 1940.



The curve is typical of that of a respiratory infection.

The types of congenital defects related to the year of occurrence of the maternal infection are:

1923: deaf mutism (1 case)—now an adult aged twenty years and five months.
 1937: deaf mutism (3 cases), deaf mutism and heart disease (1 case).
 1938: deaf mutism (1 case).
 1939: heart disease (1 case).
 1940: deaf mutism (78 cases), deaf mutism and heart disease (15 cases), eye disease (4 cases), eye and heart disease (4 cases), heart disease (4 cases), deaf mutism, eye and heart disease (6 cases).
 1941: deaf mutism (2 cases), eye disease (1 case), deaf mutism and eye disease (1 case).
 1942: deaf mutism and heart disease (1 case), eye disease (1 case), eye and heart disease (4 cases), deaf mutism, eye and heart disease (2 cases).

In the six cases where the children are apparently normal, the maternal infection occurred in 1940 (five cases) and 1941 (one case).

The Maternal Infection.

Inasmuch as the maternal infection took place in the majority of cases four years or longer previous to the taking of the history, it was impossible to obtain, in most cases, an accurate account of it. In some instances, the occurrence of the infection itself was forgotten and was remembered only after prompting by some other member of the family.

In 116 cases of the 136 cases under review, the maternal infection occurred in 1940, the year in which rubella was epidemic in New South Wales. Large numbers of cases were seen and diagnosed as such by service and civilian doctors. In 38 of the 136 cases, medical practitioners diagnosed the exanthem as rubella. When seen by a doctor no other diagnosis was made. However, in one case, the woman cannot recall whether the doctor diagnosed morbilli or rubella.

Seventy-one of the mothers have indicated that other members of the family suffered from rubella at the time that their infection was acquired, or that rubella was prevalent in their district. In some instances the source of infection can be traced to army personnel, among whom the incidence of rubella during 1940 was particularly high.

For the same reason that it was found impossible to obtain an accurate description of the infection, it was found difficult to grade the degree of severity. However, of 117 of the mothers who furnished some information on this point, 26 state that the infection was "moderately severe" or "severe". In four cases, the occurrence of the exanthem was followed by a threatened miscarriage. In two of these cases the infection was described as severe.

Several women volunteered the information that rheumatism or joint pains followed the infection.

In one case the mother states that infection was morbilli. This diagnosis cannot be confirmed from a medical source, and it is noted that this woman suffered from morbilli during childhood and not from rubella. The child is a deaf mute.

In one case there is a history of both rubella and morbilli during pregnancy. The former occurred at the end of the third month and the latter during the fifth month. The child is suffering from deafness and heart disease.

Information was sought as to a previous history of rubella and morbilli. The replies are summarized:

Previous history of rubella	2
Previous history of morbilli	82
Previous history of rubella and morbilli	1
No previous history	26

Nine women stated that they had suffered previously with "measles" and sixteen women did not supply any information on this point. In the majority of cases the infection occurred during childhood.

In fourteen cases, labour commenced prematurely. In three of these cases the attack of rubella was described as severe. In two cases, threatened miscarriage had followed the exanthem. In 105 of the cases labour took place at full term. No information concerning the time of onset of labour was furnished in the remainder of the cases.

There does not appear to be any relationship between the degree of severity of the maternal infection and the type of congenital defect.

Information was sought as to the general health of the mother during the pregnancy. Nothing of any significance was revealed, and in most cases the reply given was that the mother was well throughout pregnancy.

Inquiries as to a history of miscarriages and of the presence of congenital defects in either the parents' families also do not reveal anything of significance.

The committee is of the opinion that the maternal infection was rubella and that it was responsible for the causation of congenital defects in the child. It is worthy of notice that only three women admit to a previous history of the infection. The question whether, as has been suggested, some change may have and did take place in the virulence of the causal organism requires further elucidation, but is a possibility. However, it will be noted that children with a similar maternal history and similar congenital defects were born prior to 1940. It is possible that rubella, as the aetiological factor in cases of congenital defects, may have not been recognized in the past in this and other countries.

Effect of Maternal Rubella on Children of Subsequent Pregnancies.

There is no evidence to show that the occurrence of maternal rubella during one pregnancy will affect the child of a subsequent pregnancy.

Relationship of Time of Onset of Maternal Infection during Pregnancy and Type of Congenital Defect.

Table III shows the relationship of the time of onset of the maternal infection during pregnancy and the type of congenital defect in the child.

Of the 23 cases in which eye disease developed, the maternal infections occurred in 21 of them before the end of the second month of pregnancy. For the 99 children suffering from deafness and heart disease, either alone or together, and where the time of onset is known, the maternal infection manifested itself in 59 of the cases after the second month. It would appear therefore as if a definite relationship exists between the time of onset of the maternal infection during pregnancy and the type of defect; the later the onset of the infection after the second month, the less likelihood that eye defects will occur.

It will be noted that in one case where the child is apparently free of physical defects, the maternal infection occurred during the first month. It has been ascertained in this case that the rash became evident on the twenty-first day following conception, but the diagnosis of rubella has not been confirmed from a medical source. The child has been examined and her heart X-rayed at a clinic conducted by the committee. At the time of examination she was aged three years and seven months. Weight and head circumference were both normal for age. The time of eruption of teeth was normal. The child is intelligent, but according to the mother is temperamental and difficult to manage and suffers from digestive disturbances. Her birth weight was seven and a half pounds. This case may indicate that an attack of rubella during the very early months of pregnancy

TABLE III.

Congenital Defects.	Time of Onset of Maternal Infection in Months During Pregnancy.								Total.
	First.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Undetermined.	
Deaf mutism	1	30	31	15	—	—	—	8	85
Deaf mutism and heart disease	1	8	6	2	—	—	—	—	17
Heart disease	1	1	2	1	—	—	—	—	5
Eye disease	1	3	2	—	—	—	—	—	6
Eye and heart disease	3	5	—	—	—	—	—	—	8
Deaf mutism, eye and heart disease	6	2	—	—	—	—	—	—	8
Deaf mutism and eye disease	—	1	—	—	—	—	—	—	1
No apparent defects	1	—	1	1	2	—	1	—	6
Total	14	50	42	19	2	—	1	8	136

is not invariably followed by the presence of congenital defects in the child.

In the five other cases where apparently normal children were born, the maternal infection occurred during the third month, fourth month and fifth month (two cases) or seventh month.

In eight cases the mothers could not recall the time of onset of the infection. In all other cases where congenital defects occurred in the children the infection occurred during the first four months of pregnancy. It would seem therefore that if rubella attacks a woman who is more than four months pregnant, the fetus will escape injury.

The Child and the Congenital Defect.

Of the 130 children suffering with one or more congenital defects, only 27 weighed more than seven pounds at birth. The birth weights of those born at full time ranged between three pounds eight ounces and nine pounds five ounces.

The average birth weight of 130 children with congenital defects was five pounds fifteen ounces; of 76 children suffering from deaf mutism only six pounds one ounce; of 13 children suffering from deaf mutism, eye and heart disease, five pounds five ounces; of 22 children suffering from eye disease (either alone or associated with other defects), five pound twelve ounces.

The average birth weight of the six children who are apparently free from defects is seven pounds one ounce.

One child suffering from deaf mutism, eye and heart disease weighed seven pounds six ounces at birth, whilst some deaf mutes weighed under five pounds and several under four pounds.

All of the above children were born at full term.

The majority of the children were late in sitting up and walking and very many of them have presented problems in feeding. Some in their fourth year have not taken, as yet, solid foods. In some instances, the original reason for seeking medical advice was failure to thrive following feeding difficulties. As a result many of the children are below average weight.

In some cases deafness was noticed in a child by the parents during the first year, but in most cases this defect was not recognized until about the second birthday, when the failure to talk brought the defect to the parents' notice.

Of the group under review, deaf mutism occurred in 85 children; deaf mutism and heart disease occurred in 17 children; heart disease in five children; eye disease in six children; eye and heart disease in eight children; deaf mutism, eye and heart disease in eight children; deaf mutism and eye disease in one child.

Twenty-two children were reported to be suffering from cataracts of which fifteen were bilateral. Many of the cataracts were accompanied by microphthalmia. One child suffered from bilateral glaucoma (hydrophthalmia) and bilateral corneal opacities. In this case there was also associated heart disease.

Although deaf mutism is the most common defect in this series, it is to be noted that very few of the original cases of Gregg have been recorded. In Gregg's series of cases there were 78 children suffering from congenital eye defects, of whom 44 had associated heart disease.

Many of the deaf mutes were notified as partially deaf and able to hear vibratory noises such as aeroplanes and hand clapping. Few of them can hear the spoken voice. Some of these children are able to say a few monosyllables.

There have been four deaths recorded in this series, but other deaths have possibly occurred.

Associated congenital defects include stenosis of the nasolachrymal ducts, dislocation of the hip joint, *talipes equinovarus*, and strabismus. The incidence of these defects is not considered of any special significance.

In three cases the children were described as mentally retarded. In one case the child suffers from bilateral cataract and heart disease, and in the second, in addition to the same defects, from deaf mutism. The third child is suffering from heart disease and is possibly mentally defective.

In some instances where the children were examined at the clinics conducted by the committee, other defects, besides those notified, were discovered, particularly heart disease.

Eighteen Cases of Children with Congenital Defects, with no History of Maternal Infection.

Of these cases, twelve children are deaf mutes, three children suffer from cataracts (two bilateral and one unilateral), one child from microphthalmos of the left eye with atrophic iris and ? coloboma chorioid, and two children from deaf mutism, cataract and microphthalmia and heart disease.

These children were born:

October, 1940	1 case
January to May, 1941	13 cases
August, 1941	1 case
October, 1941	1 case
January, 1942	1 case
June, 1943	1 case

One woman states that she contracted rubella six months before the commencement of pregnancy. During the third month of pregnancy she suffered from a "severe cold". Another woman says she suffered from a very bad cold, with swollen glands and a sore throat during the fifth month of pregnancy. She states that rubella was prevalent in the district at this time. Two women admit intimate contact, one with rubella and the other with "measles", both during the third month.

Another woman says she did not feel well, was shivering and had a headache at the sixth week. There was peeling of the skin and a threatened miscarriage.

Two women say they contracted influenza, one during the second month and the other during the fourth month.

The only woman to admit a rash states that at about the eighth or tenth week of pregnancy she suffered a rash which her doctor said was due to a mixture she was taking. The rash lasted two to three days and cleared up when the mixture was stopped.

Nine women deny any illness during pregnancy. One says she was never very well, but that she never had any rash.

In view of the fact that these children apparently belong clinically to the group under review and the pregnancies in most of the cases covered the epidemic period during 1940, the possibility of subclinical attacks of rubella must be given consideration.

Clinical Survey of 54 Cases.

At the three clinics conducted by the committee, 53 children and one adult were examined. All these cases have been considered previously in this report. Each was examined by a physician, an ophthalmologist, an otologist, a dental surgeon and testers from the Deaf and Dumb and Blind Institution of New South Wales. In addition, the chest of each, except two who failed to attend, was examined radiographically to determine any cardiac abnormality.

Of the 54 examined, 24 were males and 30 females. The ages of the children ranged from one year and seven months to six years and nine months. Two children were in the second year of life, two in the third year, 41 in the fourth year, five in the fifth year, one in the sixth year and two in the seventh year. The adult was aged twenty years and five months.

The congenital defects, from which those examined suffered, comprised deaf mutism (32 cases), deaf mutism and heart disease (eight cases), heart disease (one case), eye disease (one case), eye and heart disease (three cases), deaf mutism, eye and heart disease (seven cases), and deaf mutism and eye disease (one case). One child had no demonstrable defects.

Associated defects in two cases were congenital dislocation of the left hip and double *talipes equinovarus*.

In four cases the mothers denied a history of rubella during pregnancy. In one case there is a history of intimate contact with cases of rubella at about the tenth week of pregnancy. The child is suffering from unilateral cataract and microphthalmos, deaf mutism and heart disease. This child is very typical of the cases under review. In two cases the mothers suffered from influenza, one during the fourth month, the child being a deaf mute, and the other during the second month, the child suffering from deafness, eye and heart disease. In the third case, the mother denies that she suffered from any sickness or was in contact with any cases of rubella during pregnancy. This child is deaf, with a history of delayed eruption of teeth and feeding difficulties.

Of the 51 children whose weights were recorded, only 18 were of average or above average height; of 19 children suffering from heart disease, 17 were under average weight. Six children were grossly underweight, weighing as little as 21 pounds at three years and eight months; each of these children suffers from heart disease.

In 52 cases where head measurements were taken, 44 children were found to show a degree of microcephaly. Seven of the children were greatly below average measurement; six of these seven were also grossly underweight and suffering from heart disease. The weight of the seventh child is below average, and radiological examination of the chest of this child suggests a mild septal defect, although nothing abnormal could be detected clinically.

The eight children who are not microcephalic are deaf mutes.

The general impression was formed by the examining physicians that those whose defect was deafness only were in a better state of nutrition than the other children examined. The physique of those with heart disease was in most cases fair to poor.

Nineteen of the children suffered from congenital cardiac lesions as demonstrated by clinical and radiographic examinations. Twelve of the children showed some precordial fullness, and in sixteen cases murmurs could be heard, which in two children were of the machinery type. In all except two cases there was definite enlargement of the heart, as shown by radiographic examination. One of the children had been subjected to operation in July, 1944, for ligation of the *ductus arteriosus*; the child's physique had improved and the machinery murmur had disappeared.

The diagnosis of congenital cardiac lesions may require later examinations, and with this in mind the committee is unable to determine the incidence of particular types of lesions following a single examination. That a correct diagnosis should be reached is important in view of the promising results which can be achieved by cardiac surgery for the closure of patent *ductus arteriosus*.

In seven cases clinical examination of the heart failed to reveal anything abnormal, but X-ray examination showed some alteration in the size of the heart or pulmonary artery suggestive of congenital lesions. In the absence of clinical findings and as the general physique of each child is good, the reports must be accepted with a degree of caution.

Twelve children suffered with congenital cataracts of the type originally described by Gregg. In seven cases the cataracts were bilateral; in the remainder, the left eye was affected. In each case the eye was microphthalmic. The eyes of six of these children showed nystagmoid movements. Other ocular defects in this group included atrophy of the optic nerve, some atrophy of the iris, stenosis of the nasolachrymal ducts and strabismus. One child had a cataract of the left eye and atrophy of the left optic nerve, bilateral microphthalmia and some atrophy of the right iris. The maternal infection occurred during the first month of pregnancy; there were no other defects apparent.

In two cases with unilateral cataract, pigmentary changes were seen in the fundus of the unaffected eye. Similar changes were seen in the eye of one child with bilateral cataracts. Twelve children who had no other ocular defects also showed pigmentary changes; in eight of them both eyes were affected. The ophthalmoscopic appearance of these changes was of a distinctive type and would appear to be peculiar to this condition.

The girl, aged twenty years and five months, had myopic astigmatism.

Forty-three of the 54 children examined were deaf with secondary mutism.

All these children were backward in speaking and not one was capable of putting sentences together. In most cases, speech was limited to a few monosyllables, but two of the children, both aged three years and nine months, possess vocabularies of twenty to thirty words. It is doubtful whether any child was totally deaf, although the response from four children was unsatisfactory. Most of the children could hear loud, sharp sounds, such as a hand clap, an aeroplane, a whistle or a telephone bell. There was a degree of deafness present to the extent that the children could not comprehend what was spoken to them. Many of the mothers stated at the time of examination that the hearing of their children seemed to be improving. It is considered that any hearing improvement would run parallel to improvement in the power of concentration which was noticed to increase rapidly during the second half of the fourth year of life. The drums in all cases were found to be normal in appearance.

The main dental abnormality was the retardation of eruption. The deviation from the normal age of eruption would appear to be of minor importance in view of the fact that in all cases there was a full complement of teeth by the time the child reached the age of three to three and a half years. It should be noted that delayed dentition is also found in other conditions, such as rickets, syphilis *et cetera*, and that in many cases dentition is delayed from no apparent cause. In fourteen cases, developmental defects of teeth were noted, but except in two cases, the abnormalities were only slight. One case showed some sign of interference with enamel formation which would have taken place about the sixth or seventh month. Another case showed marked interference with the process of calcification, the teeth being opaque instead of translucent. In the other cases, irregular areas of imperfect calcification were the only manifestations.

Abnormalities of the dental arch were observed in eleven cases; if these, a few were associated with high palates. In other cases, the only manifestation was slight overcrowding of the lower teeth. There was a definite history of thumb-sucking in some cases, which could account for this irregularity.

In nine cases dental caries were present, in three cases of a marked degree. This might be considered slightly above the normal average.

The teeth and oral mucosa in the majority of cases were in exceptionally good condition. Quite a number of the children possessed perfect dentition.

There would not appear to be sufficient evidence to indicate any marked interference of a permanent pathological nature with normal dentition or that the retardation of eruption had any relation to the time of onset of rubella during pregnancy.

Both the physicians and the testers from the Deaf and Dumb and the Blind School attempted to assess the intelligence and the educability of the children. In most of the cases it was possible to form a general impression of the child's mental state and educational prospects.

The histories of many of the children examined indicated that for the first few years of life there was a general instability of the nervous system. Sleeplessness, inability to concentrate and the exhibition of a peculiar fleeting, prying interest in things were common to most of them. At the time of examination the majority of children had reached their fourth year, and it was noted that the power of concentration had greatly improved. Cooperation of eyes and hands was good and there were definite indications of progressive mental development.

In three cases, where there was some doubt as to the mental condition, the children were too young for an opinion to be formed. In these cases careful examination during the fourth year is necessary.

Three children were considered fit for normal school education. One child has no apparent defects, one suffers from an unilateral cataract and the other from a cardiac lesion. The poor physique of the last child may be a severe handicap.

The assessment of the mental development of one child, aged three years and seven months, and suffering from deafness, bilateral cataracts and heart disease, was difficult, but it is possible that this child is mentally defective.

In all other cases it is considered that these children are educable and that their future prospects for earning a living are good. The type of education required will vary according to the type of defect or defects with which they are suffering.

Before these children reached their third birthday it was the opinion of many medical practitioners that a large number were mentally defective, but apparently thought had not been given to the tremendous retardation which must occur in a young child when there is a loss of hearing or sight. At about the third birthday the power of concentration increases with a consequent hastening of general improvement in the mental state.

The girl, aged twenty years and five months, is a talented commercial artist. She can speak a few words and has a small degree of hearing for the spoken voice. Her education at the Deaf and Dumb and the Blind Institution did not commence until she was nine years of age.

The committee considers that institutional training should not be commenced until after the fourth birthday, when the power of concentration has increased and the nutritional state of the child improved. In the early years of the child's life, remembering that most of these children take their food with difficulty and are in a sense "problem children", individual care and teaching by the mother and association with other children are considered most essential.

Conclusions.

During the period of its appointment, the committee has paid attention chiefly to the effect of the maternal infection on the child, and has been enabled to arrive at the following conclusions:

1. That the maternal infection was rubella, with possibly an increase in the virulence of the organism.
2. That cases of congenital defects following maternal rubella during pregnancy had occurred previously to 1940, but the relationship between maternal infection and the congenital defect or defects had not been recognized.
3. That it is impossible to estimate the number of pregnant women and subsequent children affected as a result of the epidemic of 1940.

4. That apparently children are not affected when the maternal infection occurs after the fourth month of pregnancy.
5. That the defects noted have been deaf mutism, eye and heart disease, and possibly mental defectiveness, and that the first three defects may occur singly or in any combination.
6. That there is no relationship between the severity of the maternal infection and the nature of the defect in the child.
7. That if the maternal infection occurs after the second month of pregnancy there is less likelihood of eye disease occurring in the child.
8. That a large number of the affected children are below normal average birth weight.
9. That the majority of the children are below average weight for age and that they show a degree of microcephaly and their general physique is generally below standard.
10. That many of the children are late in sitting up and walking and difficulties in feeding are common.
11. That during the first few years of life, signs of general instability of the nervous system of the children are common to most of them.
12. That the deafness is not absolute and the apparent improvement in hearing about the second half of the fourth year is secondary to improvement in the power of concentration at this period.
13. That the main dental abnormality is retardation of eruption, but that at three and a half years all the children had a full complement of teeth.
14. That very few of the children are mentally defective, though many are mentally retarded, but that the majority of the children are educable and will be fit to earn their own living, following appropriate education.
15. That there is no evidence to show that the occurrence of rubella during pregnancy has any harmful effects on the mother.

The committee is of the opinion that any investigation to determine a method of prevention of rubella depends primarily on the isolation of the causal organism. Considering the amount of damage done to a large number of children by this infection, no effort should be spared in seeking some means to protect women from it during the child-bearing age.

Recommendations.

The committee desires to recommend:

1. That the National Health and Medical Research Council be approached to initiate laboratory studies of rubella, to isolate the causal organism and to determine a method of prevention of rubella.
2. That the investigation of cases of congenital defects following maternal rubella during pregnancy be continued by the Department of Public Health, particularly with regard to the recording of "negative" cases.
3. That the substance of this report be published in THE MEDICAL JOURNAL OF AUSTRALIA.

Acknowledgements.

The committee wishes to acknowledge the help and cooperation of the following: the Board of Management, the Chief Executive Officer and the staff of the out-patient and X-ray departments of the Royal Alexandra Hospital for Children, the Superintendent and the Misses E. C. Cole and A. D. Burns of the Deaf and Dumb and the Blind Institution of New South Wales, Dr. Pudney, Senior Dental Officer of the Department of Education, and officers of the Department of Public Health.

N. McA. GREGG (Chairman), W. RAMSAY BEAVIS, M. HESELTINE, A. E. MACHIN, D. VICKERY (Members), E. MEYERS (Secretary).

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on November 8, 1944, at the Children's Hospital, Carlton, Melbourne, Dr. ALAN MCCUTCHEON, the President, in the chair. Parts of this report were published in the issues of June 9, 1945, and July 21, 1945.

Cretinism and Gargoylism.

Dr. J. W. GRIEVE showed a female child, aged seven months, a typical cretin. The baby had been two weeks premature; delivery had been normal, and the birth weight was ten and a half pounds. A severe hemorrhage from the cord occurred and required blood transfusions. The child's mother and father were alive and well, and there were two other children, both normal. The child always took her feedings badly, and needed gavage on occasions. At the age of four months the parents noticed that the child had a large tongue. Nasal discharge was profuse. On examination, the baby was a typical cretin. She had scant hair, coarse facial features and dry skin. She had a large abdomen and an umbilical hernia. She was retarded for her age. Dr. Grieve said that the only other similar patients that he could remember, who had large tongues interfering with feeding, had been only a few weeks old. This baby, who was aged seven months and was still having difficulty, was unusual in his experience.

Dr. Grieve's second patient was a male child, aged eight months. Three months earlier the baby had been operated on for bilateral inguinal hernia. His mother and father were normal and enjoyed good health. There were no other children. There was no family history of gargoylism. The baby always had a kyphosis and a chronic cough. He was admitted to hospital with an upper respiratory tract infection. On examination, he was a rather dull-looking child, sniffing and snorting all the time. He poked his tongue in and out frequently. He had severe lumbar kyphosis. He could sit up, but could not support his weight on his feet. He was active, and appeared intelligent enough for his age. He had misty cornea, but his vision seemed normal. His limbs appeared normal. The fontanelle was large, and large bosses were apparent on the skull over the ears. The hair line was low over the forehead. He had a high arched palate. X-ray examination of the spine and long bones revealed a kyphosis in the upper lumbar region due to imperfect development of the body of the second lumbar vertebra; the appearance was that seen in gargoylism. There was no evidence of rickets, but the architecture of the long bones suggested some osseous dystrophy. The blood cholesterol content was 189 milligrammes per hundred cubic centimetres. The serum calcium content was 12.7 milligrammes and the plasma phosphorus 2.5 milligrammes per hundred cubic centimetres. The Wassermann test failed to produce a reaction.

Dr. ROBERT SOUTHBY said that those present were fortunate to be given an opportunity of comparing and contrasting cretinism and gargoylism in two patients of the same age. The child suffering from gargoylism showed less mental retardation than was usually seen. Some patients were not so mentally retarded as others. Clouding of the cornea became more and more pronounced as these children grew older, and the eyesight became more impaired. Deafness also supervened in many cases. The baby under discussion also had not such a profuse nasal discharge as usual. Such children usually died from bronchopneumonia. The radiological features in the spine were typical, as also was the presence of inguinal hernie. Dr. Southby said that the first patient suffering from gargoylism presented to the society was shown to Dr. Robert Hutchison, who was unable to put a name to the condition.

Dr. J. N. BURGESS said that the case was interesting from the radiological viewpoint. All the patients he had seen had the typical change in the spine, generally affecting the second lumbar vertebra; it was wedge-shaped and hooked anteriorly. He asked whether this sign was diagnostic of the disease.

Dr. JEAN MACNAMARA said that she believed the kyphosis could be reduced by the use of a papoose splint, such as that in which the Canadian Indians normally nursed their babies.

Dr. Grieve, in reply, said that the two children were shown for the purpose of comparison or contrast, and because of the rarity of gargoylism. Dr. Wait had brought a patient to see him two months previously and asked whether the child was a cretin. The child had kyphosis, and X-ray examination revealed osteochondrodysplasia and a hook-shaped lumbar vertebra. There was no response to thyroid therapy. Gargoylism was thought to be a much more likely diagnosis than cretinism. Cretins had short limbs, and the ossific centres were late in appearing. The dosage of thyroid was rather controversial. It was usual to start on a small dose and gradually increase it. In those cases in which mechanical difficulties arose from the large tongue, it was wise to start with large doses—for example, one-quarter of a grain three times a day—and increase the dose to half a grain three times a day.

With regard to the mental development of children affected by gargylism, Dr. Grieve said that he had seen three patients recently, all of whom had quite reasonable mentality. Because the disease was familial one had to be very guarded concerning subsequent offspring. Professor Schuller had said that the elongated sella was partly responsible for the nasal discharge. In answer to Dr. Burgess's question, Dr. Grieve said that he could not say whether the vertebral changes were absolutely diagnostic, but probably he would not make the diagnosis of gargylism in its absence.

Meningo-Vascular Syphilis with Spasticity.

DR. JEAN MACNAMARA showed a female child, aged five years and four months, suffering from spasticity resulting from meningo-vascular syphilis. The mother was in good health, though the Wassermann test produced a reaction with her blood serum. The father was well, and his blood serum failed to react to the Wassermann test. The child had a healthy brother, aged seven and a half years. The mother had had no miscarriages. The girl had always been miserable and difficult to rear. Twelve months earlier, when on holiday in the country, she had fallen over some rough ground; she had previously managed to walk on the smooth city pavements. Her speech had been slurred for one month. Nine months earlier she was examined by her local doctor, who had diagnosed *genu valgum* and ordered splints. As no improvement occurred, she was referred to an orthopaedic surgeon, who observed the spasticity and sent her to the Children's Hospital. On examination, she had a typical spastic paralysis of the lower limbs, and the gait was spastic. Dr. Macnamara said that she was struck by the unusual degree of ankle clonus present; this exceeded by far that usually seen in spastic paralysis due to birth injury. X-ray examination of the spine revealed no abnormality. Lumbar puncture was performed; the cerebro-spinal fluid contained an increased amount of protein, and reacted to the Wassermann test. The colloidal gold reaction was confirmatory of syphilis. Dr. Macnamara said that tryparsamide, one gramme per week, was being used in the treatment.

DR. ROBERT SOUTHEY said that he was interested in the family history. The blood serum of the father and brother failed to react to the Wassermann test. The serum of the mother and the patient gave positive reactions. Dr. Southey wondered whether this was an example of third-generation transmission, though he did not observe any stigmata in the mother or brother. The boy had a rather suggestive nasal bridge, and he had a highly arched, narrow palate. It would be worth while repeating the Wassermann test on his serum, especially after giving him a provocative dose of neoarsphenamine. Dr. Southey observed that in the case patients who had nervous system manifestations and whose cerebro-spinal fluid reacted to the Wassermann test, no matter how much treatment, including malaria therapy, was given, the ultimate result was disappointing. The blood continued to react to the Wassermann test and the prognosis was not good.

Dr. Macnamara, in reply, said that the child was sent to her because she was spastic. Patients with all sorts of conditions gravitated towards the "spastic" clinic. Dr. John Heath was investigating the family tree, and treatment of the patient rested with his department.

A MEETING of the Melbourne Pædiatric Society was held on April 11, 1945, at the Children's Hospital, Melbourne, Dr. E. PRICE, the President, in the chair.

Ateliosis.

DR. ROBERT SOUTHEY showed two children as examples of simple dwarfism. The first was a girl, aged nine years. She was the second child in a family of four girls. The pregnancy was apparently normal, the confinement uneventful, and although she was born at full term the baby weighed only four pounds, but was otherwise perfectly well. She progressed satisfactorily, but had always been diminutive in stature. Her mentality was normal, and she had advanced at school, being head of her class. The Wassermann test produced no reaction, no abnormality was detected in the urine, and X-ray and biochemical investigations revealed no abnormality. The patient was much smaller than a sister two and a half years younger than herself. The mother was a small woman, and the maternal grandmother had been very small until the age of two years, when she had begun to grow normally; she was now of more than average weight and height for her years. Dr. Southey said that the patient was presented as an example of simple dwarfism or ateliosis.

Dr. Southey's second patient was a boy, aged eleven years. He was the third child of a family of four—two girls and two boys. He was a full-time baby, the result of a normal pregnancy and a normal confinement, and he weighed nine pounds at birth; he progressed well until the age of three years, when he "marked time", and from this age onwards his growth had been retarded. At his present age he was diminutive in stature, but well proportioned, and was considerably smaller than two younger members of the family. Mentally he was well advanced and did well at school. As in the case of the previous patient, all investigations gave negative results. This boy was given injections of "Testoviron", five milligrammes a week for eight doses, after which time he had grown one inch in height, but had not gained appreciably in weight. Dr. Southey said that it was proposed to continue this treatment for a further period. This boy was also regarded as an example of ateliosis, which meant "not reaching to perfection".

Dr. Southey remarked that both these children gave him the impression of normal children looked at through the wrong end of a pair of field glasses. Dr. Southey showed a photograph of various types of dwarfs, taken from Williamson's "Handbook of Diseases of Children". Over the last few years many such types had been presented at meetings of the society. Dr. Southey thought that these two cases of simple dwarfism completed the picture.

Morquio's Disease.

DR. LESLIE WAIT said that he had the unique experience of presenting a second pair of patients to illustrate the syndrome of osteochondrodystrophy as described by Morquio. The previous cases, those of father and son, had been described by him at an earlier meeting of the society. This time the patients were a mother and her daughter. Another reason for presenting these cases was to obtain an expression of opinion as to whether Morquio's syndrome was a distinct entity or whether it was related to achondroplasia. Dr. Wait said that there appeared to be striking differences between the two conditions.

In the cases presented it seemed rather unusual that the mother, who had Morquio's dystrophy, should give birth to a child with the same condition. Dr. Wait said that he believed attempts had been made in the past to "breed" dwarfs as court jesters, but without success. Patients with Morquio's dystrophy appeared to suffer more from their deformities than did achondroplasias. Both achondroplasia and Morquio's dystrophy were hereditary and familial. Parsons considered that all these conditions should be grouped under the name of chondrodysplasia. In the cases under discussion, the child had been delivered by Caesarean section at the Women's Hospital, Melbourne. The mother was radiologically examined prior to operation, and she was regarded as suffering from osseous dystrophy, not of the achondroplastic type. The baby's birth weight was six pounds three ounces and the length 19.5 inches. The child was regarded as normal. This was striking, as an achondroplastic child was recognizable as such at or soon after birth. It was the mother who recognized the condition when the child started to walk at the age of fifteen months. At the time of the meeting the child was four years old, and she was an exact replica of her mother. The shape of the head and the facies of both were normal, in contradistinction to the achondroplastic, who had a typical head and facies. The intelligence of mother and daughter was normal. The trunk, limbs, hands and feet bore a resemblance to those of an achondroplastic. The skeletal changes as described by Morquio were well illustrated in the X-ray pictures of mother and child. The mother's height was 40 inches and the daughter's 33 inches. The mother had three brothers who were normal, one being over six feet in height; her mother and father were of average height, and there was no family history of dwarfism. The father of the child under discussion was apparently normal. The mother's blood serum failed to react to the Wassermann test. The child had grown three-quarters of an inch in the past six months. She was having weekly injections of "Perandren", which was being given at the request of the mother, who desired her child to be spared the ignominy and ridicule of dwarfism.

DR. H. DOUGLAS STEPHENS asked whether any instances had been recorded in which Morquio's disease was only partial in its distribution, as had occurred in achondroplasia.

Dr. Robert Southey said that the general appearance of the mother did suggest achondroplasia, but the X-ray films revealed the true condition present. These cases showed that achondroplasia, Morquio's disease and gargylism were in some way related. The X-ray films of the child's spine showed the features of Morquio's disease, as distinct from those seen in gargylism. Dr. Southey said that it was

remarkable that the dwarf mother was able to go through pregnancy and deliver a child who had thrived so well. More frequently the child died at or soon after birth, and if it did survive this hazard, remained a weakling.

DR. KEITH HALLAM said that it was generally agreed that the X-ray appearances of the child's spine were not those of a true platyspondylia, but of incomplete ossification of vertebrae. Comments were also made on the tiny ossific centres of the femoral heads, the development of which had reached the stage of a nine months old baby. On the contrary, the development of the child's teeth seemed advanced.

DR. J. N. BURGESS said that Brailsford had described the condition before Morquio, though the latter had got the credit. The two conditions of Morquio's disease and achondroplasia appeared to be related as far as the osteochondrodystrophy was concerned, but the epiphyseal changes were more prominent in Morquio's disease.

DR. J. COLQUHOUN said that he had been confronted with all sorts of bone anomalies and sometimes a mixture of several different entities to which it was impossible to put a name. Dr. Colquhoun said it was interesting to note the effect of weight-bearing on the bone. Most of the changes seen were like those expected to occur if bony softening was present, especially at the epiphysis, with splaying out of the diaphysis. The development of scoliosis in the mother, which was pronounced, had the same simple basis. There was no evidence of flattening or platyspondylia to be seen in the mother's X-ray films. It might be asked why similar changes were not present in the upper extremities. Changes in these limbs, however, did occur. Dr. Colquhoun recalled a girl with extensive polyarthritis associated with severe ankylosis. In this case such changes were indeed seen near the wrists. Owing to the presence of a poorly developed axilla and glenoid cavity, more effort was put into arm movements, and an enlarged humeral tuberosity resulted.

Dr. Keith Hallam spoke again; he referred to the splaying of the ends of the long bones apart from the weight-bearing bones. In such patients as those shown by Dr. Wait, pathological softening of the metaphysis occurred. The action of muscles was to shorten, and this change in muscle tension with muscular activity produced the effect demonstrated over the softened bony areas.

DR. ERIC PRICE said that in these diseases of bone the various factors involved were not known, and so it was difficult to state whether or not one syndrome was related to another. The most that could be done was to recognize various syndromes. With further enlightenment relationship might be proven. Dr. Price said that he thought Dr. Burgess had epitomized the difference between Morquio's disease and achondroplasia when he said that in the former the epiphyseal changes predominated.

Dr. Wait, in reply to Dr. Stephens, said that it was possible for partial changes to occur in the chondrodysplasias. Patients with Morquio's disease seemed to suffer more physical disability than patients with achondroplasia. Morquio had said that more muscle weakness and wasting occurred in Morquio's disease than in the other chondrodysplasias. This was not a feature of achondroplasia. Dr. Wait said that he was indebted to Dr. G. Anderson for bringing the patients to his notice.

(To be continued.)

THE VICTORIAN MEDICAL WOMEN'S SOCIETY.

The annual meeting of the Victorian Medical Women's Society was held in the lecture room at the Queen Victoria Hospital on March 12, 1945. In the absence of the retiring president, Dr. Eileen Fitzgerald, the chair was taken by Dr. Marion Wanliss until after the election of office-bearers.

The minutes of the last annual meeting were read and confirmed, and reports were read by the Honorary Secretary and the Honorary Treasurer.

Election of Office-Bearers.

Office-bearers for the ensuing twelve months were elected as follows:

President: Dr. Doris Officer.

Vice-President: Dr. Florence Cooper.

Honorary Secretary: Dr. Elizabeth McComas.

Honorary Assistant Secretary: Dr. Elizabeth Turner.

Honorary Treasurer: Dr. Phyllis Tewsley.

Members of the Committee: Dr. Eileen Fitzgerald (the retiring president *ex officio*), Dr. Marion Wanliss, Dr. Lorna Lloyd-Green, Dr. Allison Mackie.

Representative of the Australian Federation of Medical Women: Major Mackenzie.

Representative on the Council of the Victorian Branch of the British Medical Association: Dr. Elizabeth McComas.

Representative on Free Kindergarten Union of Victoria: Dr. Hilda Kincaid.

Representatives on Central Council of Baby Health Centres of Victoria: Dr. Younger Ross, Dr. Elizabeth Turner.

Representative on Women's College Council: Dr. Adelaide Gault.

Other Business.

Dr. Ida Brodrick was elected a new member.

An interesting address was given by Captain Clara Lee (A.A.M.C.) on "Psychiatric Problems Met with Among Service Women".

Post-Graduate Work.

MELBOURNE PROGRAMME FOR AUGUST.

The Melbourne Permanent Post-Graduate Committee announces the following programme for August, 1945.

Clinical demonstrations suitable for candidates presenting themselves for M.S. Part II and F.R.A.C.S. examinations will be held on Tuesdays at 2.15 o'clock p.m.:

August 7, by Mr. R. H. Hadley at Saint Vincent's Hospital.

August 14, by Mr. R. Officer at the Alfred Hospital.

August 21, by Mr. Henry Searby at the Royal Melbourne Hospital.

August 28, by Air Vice-Marshal Victor Hurley at Royal Melbourne Hospital.

These demonstrations will be continued each week.

Pathological demonstrations suitable for candidates presenting themselves for M.D. Part II and M.R.A.C.P. examinations will be held on Thursdays at 5 o'clock p.m.:

August 2, by Dr. H. A. Sissons at the Alfred Hospital.

August 9, by Dr. R. J. Wright-Smith at Royal Melbourne Hospital.

August 16, by Dr. Tait Smith at Saint Vincent's Hospital.

August 23, by Dr. John Horan at Saint Vincent's Hospital.

August 30, by Dr. Tait Smith at Saint Vincent's Hospital.

These will also be continued each week.

Lectures on "Malignant Conditions" by Dr. R. Kaye Scott will commence on Monday, August 6, at 4.30 o'clock p.m., at the Royal Melbourne Hospital.

Enrolments for these courses should be made with the secretary, Post-Graduate Committee, College of Surgeons Building, Spring Street, C.1.

Correspondence.

INJURIES BY UNKNOWN AGENTS TO BATHERS IN NORTH QUEENSLAND.

SIR: With reference to Mr. McNeill's acknowledgement of the receipt of specimens of *Physalia* from Green Island, I would like to add that I have, as already reported, found specimens dried on the beach at Low Island, 50 miles further north, whilst the notes below indicate that this siphonophore is found at least as far south as Townsville, more than 200 miles south, so that its range is at least along 250 miles of coast line.

Although I have seen victims with the typical weals caused by *Physalia*, I have never yet seen the excoriated weals referred to by Mr. McNeill. I give in full, case notes with post-mortem findings of two victims. Probably the first and almost certainly the second was caused by the *Physalia*, and there is nothing to suggest that the carybdeid was responsible for the second at least.

The Cairns Post of January 21, 1937, reads:

Within 8 minutes of being stung by the deadly Portuguese Man-o'-War, while bathing at Bramston Beach, 12 miles from Mirriwinni this morning, D.W.T. (19) [name given] collapsed and died. Young T., who had been holidaying with his aunt, was in the water at 7 a.m. with a friend. They waded out waist deep and almost immediately the Man-o'-War tentacles became wrapped around the victim's abdomen. His companion helped to free him to shore. T. staggered about 50 yards and collapsed. He died within 8 minutes.

Dr. T. W. Carroll, of Babinda, performed a post-mortem examination and reports:

It was a well developed muscular body—post-mortem staining of the back and buttocks had taken place. Across the skin of the abdomen and chest there were a number of dark red bands. These varied in size up to about a quarter of an inch in width. Over some of them the skin was broken and sand was adherent to the skin abrasions. Blood-stained froth was present in the mouth, nose and bronchial tubes. Apart from the heart and lungs, the man was otherwise normal. The heart was slightly enlarged—there was a fatty infiltration of the myocardium and the mitral valve flaps showed some chronic inflammatory nodules. Throughout both lungs there was an excessive amount of fluid present and frothy blood-stained fluid could be expressed into the bronchioles.

The history is given that he was emerging from the water when he became encircled by the tentacles of what was described as a Portuguese man-o'-war. He complained of severe burning pain at the points of contact and his companions assisted him to scrub it with sand. The pain in his chest continued and he collapsed and died in seven minutes from the time of attack.

Dr. E. H. Moore, Superintendent of the Townsville Hospital, supplies particulars of another fatal case.

Mother's statement. The boy had been swimming and left the water quite well. However, he ran back into the water up to his knees, then ran out again crying. After running fifty yards he collapsed and could just manage to say that he had been stung on the legs. His mother noticed linear weals on the legs and the stings of what she called the Portuguese man-o'-war. The boy died soon afterwards. Age, seven and a half years. Previously quite well.

Statement of witness, A.B., a man, aged twenty-five, who has himself been stung by the Portuguese man-o'-war and who ran to the boy when he fell. He states that the stings present on his legs were the threadlike processes that are attached to the cup-like body of the Portuguese man-o'-war. He removed the threads at the time with a towel and said that the red weals present were the same as he has seen on other people stung in the same way.

The boy was dead on arrival at the hospital and had large weals, becoming purple, on the legs, just as if something had been wrapped round the legs.

Post-mortem report (Dr. Halberstater). Bronchitis present. Some interlobar pleurisy on the left lung. Large weals present on both legs. No other abnormality found.

Yours, etc.,

Cairns,
North Queensland,
Undated.

H. FLECKER.

FAMILIAL BELL'S PALSY.

SIR: I should like to report a case of Bell's disease. A girl of sixteen years of age came to see me with a mild Bell's palsy of the face. The mother was with her, and she told me that she had had the same complaint at twelve years of age; this was borne out by a slight paresis of face still remaining. She also stated that her mother had had the same complaint. Her younger sister had had an attack about two years ago.

I have never noticed any mention of an hereditary predisposition to this disease in my readings, so thought this case worth recording.

Yours, etc.,

"Ardoch Tower",
Brewster Street,
Essendon,
Victoria.
July 3, 1945.

PERRY HAM.

Obituary.

THOMAS CHERRY.

We are indebted to Dr. Colin Macdonald for the following appreciation of the late Dr. Thomas Cherry.

Thomas Cherry, who died suddenly in Melbourne on May 27, 1945, was born at Gisborne, Victoria, on October 27, 1861. His father, Edward Cherry, a carpenter, had arrived in the

colony in 1855 and had set out for the Castlemaine goldfields, but the country around Gisborne reminded him of his native Hertfordshire hills, so he settled there. Shortly after, he began the manufacture of the patent Cherry churns, which for many years have been well known throughout Australia. Thomas Cherry was educated at the Gisborne Board School, and later at Saint Paul's School, Geelong. He left at the age of sixteen, after passing the matriculation examination, and returned to Gisborne, being taken into partnership (along with his elder brother George) by his father. Here he remained for the next seven years; his business brought him into contact with the farmers for many miles around, and he acquired an interest in, and a knowledge of, farming methods which provided the foundation for the agricultural phase of his career. It was doubtless at this time also that he became an expert draughtsman, and acquired the skill and love of a craftsman in wood and stone.



In 1885 he began his medical course, entering into residence at Ormond College. A devoted attachment to the college and to its Master, Dr. (later Sir John) MacFarland, was to last throughout his life. His second son was named after the Master, while he served on the College Council for over twenty years, and lunched at its high table for nearly twice this period; he therefore had a close association with Ormond for sixty years. In his medical course he was placed first in each of the five years; after graduating, he spent a year as senior house surgeon and physician at the Melbourne Hospital, and though he took the higher degrees of M.D. and M.S., he never again practised medicine; at the time of his death he was the senior holder of both these degrees, Sir James Barrett having predeceased him by a few weeks. In 1891 he went to England, where he continued his studies in pathology and bacteriology at King's College, London, and the University of Aberdeen. He returned to Melbourne to take up the post of demonstrator and assistant lecturer in pathology, to which, during his absence, he had been appointed. (He must surely have established an academic record when half a century later he resumed, owing to war's exigencies, the same position as a demonstrator in pathology.)

In 1894 Thomas Cherry again visited Europe, making contact with the leading bacteriologists in England, France and Germany. On his return he began the bacteriological diagnosis of cases of diphtheria, tuberculosis, typhoid and other diseases for the public hospitals and for private practitioners. This work, together with the regular examination of the Yan Yean and other water supplies, gradually developed, so that in 1900 he was appointed lecturer in bacteriology, and

(at a time of severe financial retrenchment) the bacteriological laboratory was built by special governmental vote. It was through bacteriological work that he became associated with the Department of Agriculture. From 1894 onwards he acted as expert adviser to the Stock Branch, being consulted in regard to every important outbreak of disease which occurred in Victoria. In 1895, in the course of an investigation into liver fluke of sheep, he identified the fresh-water snail which acts as the intermediate host in this country for this parasite. In 1899 he was appointed assistant to the Royal Commission on Technical Education, and was sent to Europe to investigate the agricultural aspects of this inquiry.

On his return from Europe, he organized regular classes at the University of Melbourne for training butter factory managers in bacteriological methods; in 1902 he was appointed to the Department of Agriculture as bacteriologist and scientific instructor in dairy farming.

During 1901 he was Acting Registrar of the University of Melbourne, assisting Dr. MacFarland in reorganizing university finances after the defalcations of a trusted and obliging accountant, who, under the influence of tardy horses, had embezzled £24,000. Incidentally, this miscreant, the recipient of a five years sentence, was less fortunate than his colleague the treasurer of Trinity, who at the same period was successfully absconding with £2,000 of college funds to the tropic paradise of Samoa.

At the end of 1904 the late George Swinburne became Minister for Agriculture in the then Government and entered upon a vigorous policy of reorganization and development. Believing that education should be the essence of the department's work, and that this should be founded upon scientific knowledge, he selected Thomas Cherry for the post of director.

In 1911 the Government subsidized for five years a professorship of agriculture at the university, and Cherry was appointed thereto. His work during his six years as director of agriculture had been extremely strenuous. Nearly half of each week was spent in travelling, lecturing and inspecting in the country, for which he always had to leave home at 7 a.m., and often as early as 5 a.m. Of the many projects initiated under his directorship, the establishment of the Lady Talbot Institute for pure milk may be specially mentioned; there seems little doubt he was mainly instrumental in its foundation.

Half-way through Thomas Cherry's tenure of the chair of agriculture, the war broke out in 1914. Before long his students had all enlisted; and at the end of 1916 the professor followed suit. He became a major, Australian Army Medical Corps, his work being to advise on the measures necessary to prevent soldiers suffering from bilharziosis spreading this disease on their return to Australia. Later he was sent to Egypt; here he served as pathologist to the Fourteenth Australian General Hospital, and subsequently with the Second Light Horse Field Ambulance in Palestine. By the time Cherry had arrived in Egypt, Leiper, the Royal Australian Army Medical Corps pathologist, had elucidated the life history of the *Schistosoma hematobium* and its mode of infection; with this Egyptian work the names of Blois Lawton (of Melbourne), Charles Kellaway and Hamilton Fairley are associated. Cherry's contribution to this subject consisted in showing that in various parts of Australia there were fresh-water molluscs, similar to the Egyptian, which could act as intermediate hosts for the worm, and that climatic conditions were suitable in many localities for the parasite to go through its life cycle.

He had always been a keen student of evolutionary theories, more particularly relating to man, and his sojourn in Europe and Palestine brought this interest to a head. In 1920 he wrote a paper on "The Origin of Agriculture", which at Sir Grafton Elliot Smith's suggestion was read before the Manchester Literary and Philosophic Society. It is substantially the paper which was presented to the Australasian Association for the Advancement of Science in 1921, and was published in the proceedings at that congress. On many occasions in subsequent years he gave lectures on archaeological subjects to the Melbourne Classical Association; one of these, "On the Origin of the Idea of the Supernatural", was published by the Association in *extenso*.

During 1921-1934 Thomas Cherry worked as John Grice Cancer Research Fellow of the University of Melbourne, and from then on under the aegis of the Cancer Causation Research Committee, of which the late Sir David Masson was the first chairman. He visited Britain once more in 1932. His experimental work with mice was directed to establishing his theory that cancer and tuberculosis are related, and he published numerous papers on this subject. His concept

of the cancer-tuberculosis relationship has received little authoritative recognition to date, but of the permanent value of his statistical surveys of these diseases their can be little doubt. In 1944 the Cancer Causation Fund was low (from the inception it had been maintained by subscriptions of university and professional friends) and Cherry was fearful his work would have to be abandoned. But owing to the energy of that warm-hearted and resolute Scot, the late Dr. J. F. Mackenzie, a public appeal was launched which resulted in the fund benefiting by over £6,000 in a few weeks; in the circumstances this was an amazing response. Cherry was naturally overjoyed at the result, and zealously developed plans for the furtherance of his work, but he was to die within a few weeks.

In September, 1944, admirers of Cherry and his work presented his portrait (very well painted by Aileen Dent) to the university, and it was accepted by the Chancellor, Mr. Justice Lowe, in an exceedingly pleasant function in the Union House. Few happenings in their long married life could have given Dr. and Mrs. Cherry more satisfaction than the acceptance by their beloved university of this portrait which now hangs in the Wilson Hall between those of his former professorial colleagues, Sir David Masson and Sir Baldwin Spencer. Thomas Cherry married in 1894 Miss Edith Gladman (whose father had come to Melbourne from England as first principal of the Teachers' Training College), and Mrs. Cherry, together with three sons and one daughter, survive. The eldest son was killed in the 1914-1918 war; the second is Professor T. M. Cherry, of the Melbourne chair of mathematics; and the third, Colonel R. O. Cherry, of the Australian Imperial Force. The family life was extremely happy, and the old doctor was never more zestful than when demonstrating some phenomenon of natural history to his grandchildren.

Thomas Cherry was of stocky build, only a little over five feet high and weighing eleven to twelve stone; of latter years his back was bent, but his voice that of a man thirty years his junior. He was of tough constitution, having spent seven years after school in manual or outdoor work; almost to the day of his death he could walk two miles at a smart pace, and as a young man would often walk from Ormond College to his home in Gisborne thirty miles away. Of simple and frugal tastes, neither smoking nor drinking, for many years his staple breakfast was porridge, bread and dripping. As far as I know, on only one occasion did he take a normal holiday, and that for only a week or so. Cherry was an excellent draughtsman and worker with tools. His family has a charcoal copy of Landseer's well-known picture of a Newfoundland dog, with which he secured a prize at the Sandhurst Industrial Exhibition in 1879, and with pen-and-ink sketches he reached professional standard. Till the end, he was avid for information on all subjects, and every room in his large house had bookshelves. Their contents included the rare and interesting "Encyclopedia Metropolitana", and many standard works in history and theology; in the latter he was deeply read. He had always kept abreast of scientific reading; for example, in the last year of his life he went through ten recent volumes of *Nature* and compiled over fifty pages of abstracts. He was a prolific writer; in the years 1902 to 1910 he published 34 papers, mostly on agricultural subjects (in the *Journal of the Victorian Department of Agriculture*); in the years 1924 to 1944, nineteen papers on cancer and tuberculosis came from his pen. He was deeply religious, considering that the spiritual world was just as real as the physical one, and there was no conflict between religion and science, in spite of the expanding discoveries of the latter.

During his long life Cherry had known rebuffs and disappointments, but bore them all with a remarkable tolerance and generosity. For the past decade the writer had driven him daily to the city from the suburb of Glen Iris; never once did he hear him voice any unkind or reproachful word, even during the period some years ago when his work appeared to be disregarded or discredited. His rich scholarship, rare kindness and gentleness of spirit, and his venerable appearance had combined over the years to make Thomas Cherry a really unique figure, and one of whom many in Victoria will cherish a very happy memory.

DR. JOHN DALE writes: When I came to Melbourne eighteen years ago to become City Health Officer, Dr. Cherry had already reached the age at which I shall be due for retirement, but I count myself very fortunate that we were firm friends throughout those years. His great breadth of knowledge and experience were always at my disposal, and I have been very happy to be of some assistance to him in the researches into the apparent relationship of tuberculosis and cancer which occupied this last period of an astonishingly fruitful and varied career.

Although it seems unlikely that the relationship of the tubercle bacillus to cancer is directly causal, it is probable that certain common factors pave the way for the incidence of both diseases. The recognition of those factors will be of great value and one cannot doubt that Dr. Cherry's tireless efforts have contributed thereto.

PROFESSOR R. D. WRIGHT writes: In 1931 I was appointed assistant to Dr. Thomas Cherry—Cancer Research Fellow of the university. I found that I had a very remarkable chief. His knowledge of the development of ancient and modern cultures was enormous, but not ostentatious; it was a subject for friendly discussion, not for *ex cathedra* instruction. His perspective of Australian development was wide and intimate. His interest in biology took in every aspect of living things. The research he was engaged on at the time was assiduously followed, but never did he get it out of proportion to the sum of knowledge. The dignity of true learning fitted him comfortably and was enhanced by the humility of the service he gave.

H. W. ALLEN, ESQUIRE, President of the Classical Association and former Vice-Master of Ormond College, writes: Dr. Cherry was an old and valued member of the Classical Association, and a vice-president since 1930. He did not profess to be an expert in Greek and Latin, but had studied his classics—as his library showed—and knew them in a more useful and understanding fashion than many professed students. His range of knowledge was extraordinary, his memory unailing, his mind alert and young to the last. His chief interest to us was in his knowledge of archaeology, and in particular of Egyptology. When he was in Egypt during the first world war he was struck by the unique character of the Nile and its regular inundations, and came to the conclusion that only in such a river valley could systematic agriculture—and therefore civilization—have begun. He thus became one of the pioneers of the "Diffusion Theory", the belief that all civilization radiated from Egypt, and is so recognized in the writings of eminent archaeologists like Elliot Smith and Perry. He once showed me a monograph he had written on this subject, and when I said of one passage, "But Elliot Smith, in his 'Evolution of the Dragon', holds a contrary view", he replied, "Yes, I know, but I have had a talk with him since, and he has changed his opinion". But his archaeology ranged farther than Egypt; he has lectured to the Association on British pre-history, and knew all about long barrows and Beaker people and such things, and one of his addresses to us on "The Origin of the Idea of the Supernatural" was so highly regarded by us that we published it as a special pamphlet. He was a regular attendant at our meetings, and always had something to contribute to our discussions. We shall sadly miss his genial presence and his wide knowledge of ancient lore.

JOHN EDWARD OVERSTEAD.

WE regret to announce the death of Dr. John Edward Overstead, which occurred on July 14, 1945, at Rockhampton, Queensland.

HORACE EDGAR DUNSTONE.

WE regret to announce the death of Dr. Horace Edgar Dunstone, which occurred on July 13, 1945, at Adelaide.

Australian Medical Board Proceedings.

QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of *The Medical Acts, 1939 to 1940*, of Queensland, as duly qualified medical practitioners:

- Aitken, Ronald Edward, M.B., B.S., 1945 (Univ. Queensland), Silvester Street, Windsor, N.S.
 Anderson, Graham Roland, M.B., B.S., 1945 (Univ. Queensland), Mayfield Street, Ascot, Brisbane.
 Anderson, Neville George, M.B., B.S., 1945 (Univ. Queensland), 107, Musgrave Road, Red Hill, Brisbane.
 Bennett, Roger Alvin, M.B., B.S., 1945 (Univ. Queensland), 154, Lancaster Road, Ascot, Brisbane.

- Bottcher, Desmond Neville, M.B., B.S., 1945 (Univ. Queensland), 81, Limestone Street, Ipswich.
 Coates, Robert Henry, M.B., B.S., 1945 (Univ. Queensland), 84, Bayview Terrace, Clayfield, Brisbane.
 Dunn, Edward Lucas, M.B., B.S., 1945 (Univ. Queensland), 136, Talford Street, Rockhampton.
 Farinelli, Nello, M.B., B.S., 1945 (Univ. Queensland), Mourilyan, via Innisfail.
 Fogarty, Moya Graham, M.B., B.S., 1945 (Univ. Queensland), Brown Street, Bardon, Brisbane.
 Forbes, Ian Duncan, M.B., B.S., 1945 (Univ. Queensland), 168, Wynnum Road, Norman Park, Brisbane.
 Hargreaves, Eric John, M.B., B.S., 1945 (Univ. Queensland), 12, Walker Street, Bundaberg.
 King, Kevin Leahy, M.B., B.S., 1945 (Univ. Queensland), 9, Park Avenue, East Brisbane.
 Menogue, Leonard Robert Laurence, M.B., B.S., 1945 (Univ. Queensland), 11, Wight Street, Milton, Brisbane.
 Miller, Robert Andrew Macquarie, M.B., B.S., 1945 (Univ. Queensland), 28, Hazelwood Road, New Farm, Brisbane.
 Minty, Cyril Charles Julius, M.B., B.S., 1945 (Univ. Queensland), Sherwood Road, Toowong, Brisbane.
 Morris, Oriel Carlin, M.B., B.S., 1945 (Univ. Queensland), Tawarri, Florrie Street, Lutwyche, Brisbane.
 McGregor, Henry Roswald, M.B., B.S., 1945 (Univ. Queensland), Beenleigh.
 Nash, Irene Francis, M.B., B.S., 1945 (Univ. Queensland), Lang Street, Fairfield, Brisbane.
 O'Reilly, Ronald Nicolson, M.B., B.S., 1945 (Univ. Queensland), Fir Street, Bardon.
 Ponting, George Edward, M.B., B.S., 1945 (Univ. Queensland), "Leafdale", Wondal.
 Reimers, Alison Clare, M.B., B.S., 1945 (Univ. Queensland), 17, Gladstone Road, South Brisbane.
 Reye, Keith, M.B., B.S., 1945 (Univ. Queensland), Wilton Terrace, Yeronga, Brisbane.
 Schmidt, Robert Peter, M.B., B.S., 1945 (Univ. Queensland), Bromelton Road, Beaudesert.
 Streeten, George Edward Wardell, M.B., B.S., 1945 (Univ. Queensland), No. 3 Flat, "Kirrinuna", Archibald Street, West End, Brisbane.
 Williams, Maurice Cornelius, M.B., B.S., 1945 (Univ. Queensland), Goulburn Street, Kedron, Brisbane.

The following additional qualification has been registered:
 Exton, William Dunham, D.T.M., D.T.H., 1944 (Univ. Sydney), 71, Palm Avenue, Ascot, Brisbane.

Naval, Military and Air Force.

CASUALTIES.

ACCORDING to the casualty list received on July 16, 1945, Captain A. H. Nash, A.A.M.C., Millswood, South Australia, has been placed on the "seriously ill" list.

ACCORDING to the casualty list received on July 19, 1945, Major H. A. Sweetapple, A.A.M.C., Edgecliff, New South Wales, has been placed on the "seriously ill" list.

Notice.

ROYAL PRINCE ALFRED HOSPITAL MEDICAL OFFICERS' ASSOCIATION.

AN attempt is being made to revive the activities of the Royal Prince Alfred Hospital Medical Officers' Association. Provided present and past members of the honorary and resident medical staff are sufficiently interested, it is proposed to hold a reunion and clinical week on October 15 to 20, 1945. Subjects of special interest to general practitioners and servicemen will be discussed.

Owing to the war, it has not been possible to record the addresses of all men eligible for membership, and it would be appreciated if any present or past member of the staff who has not received notification of the reunion would communicate with the secretary, c/o the Royal Prince Alfred Hospital, giving his address and stating whether or not it would be possible for him to attend.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Early, Victor Maynard, M.B., B.S., 1944 (Univ. Sydney), 15, Muttama Road, Artarmon.

Anderson, Donald Edmund, provisional registration, 1945 (Univ. Sydney), Sydney Hospital, Sydney.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association as from July 1, 1945:

Chancellor, Alan Harold Bennet, provisional registration, 1945 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Corlette, Philip Manning Christian, M.B., B.S., 1944 (Univ. Sydney), No. 2, The Terrace, Newcastle.

Coyle, Edward Frank, M.B., 1942 (Univ. Sydney), NX200496 Captain E. F. Coyle, R.M.O., 16 A.I.T.B., Australia.

Goldie, John Ernest Dunlop, provisional registration, 1945 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Hagen, Paul Beo, provisional registration, 1945 (Univ. Sydney), 15, Clarendon Road, Stanmore.

Hooper, Francis Maxwell, provisional registration, 1945 (Univ. Sydney), St. George District Hospital, Kogarah.

Hunter, William Fyfe, provisional registration, 1945 (Univ. Sydney), Sydney Hospital, Sydney.

Manuel, Betty, provisional registration, 1945 (Univ. Sydney), 103, Tryon Road, Lindfield.

Robertson, Thomas Inglis, provisional registration, 1945 (Univ. Sydney), Sydney Hospital, Sydney.

Robey, Ariel Lefley, provisional registration, 1945 (Univ. Sydney), Parramatta District Hospital, Parramatta.

Rodriguez, Laurence Francis, M.B., B.S., 1942 (Univ. Sydney), NX201043 Captain L. F. Rodriguez, 11 Aust. Fld. Amb., Australia.

Short, Leslie Frederick, provisional registration, 1945 (Univ. Sydney), Wollongong District Hospital, Wollongong.

Smith, Warren James, provisional registration, 1945 (Univ. Sydney), 14, Chelmsford Avenue, Croydon.

Symonds, Barry Cyril, provisional registration, 1945 (Univ. Sydney), 274 Old South Head Road, Bondi.

Truscott, Maxwell Steven, M.B., B.S., 1939 (Univ. Sydney), 42, Towns Road, Rose Bay.

Medical Appointments.

Dr. Alexander Jamieson Meikle's resignation as Official Visitor to the Parkside Mental Hospital, South Australia, has been accepted by His Excellency the Governor in Council.

Dr. Hugh Gilmour Wallace has been appointed a member of the Dental Board of New South Wales for a period of three years from July 1, 1945.

Dr. Maurice Matenson has been appointed Government Medical Officer at Tumburumba, New South Wales.

Books Received.

"Bronchial Asthma", by Leon Unger, B.S., M.D., F.A.C.P.; Introduction by Morris Fishbein, M.D.; 1945. Illinois: Charles C. Thomas. 94" x 6", pp. 743, with many illustrations. Price: \$9.00 post paid.

"The Examination of Reflexes: A Simplification", by Robert Wartenberg, M.D., Foreword by Foster Kennedy, M.D.; 1945. Chicago: The Year Book Publishers Incorporated. 7" x 43", pp. 234, with seven illustrations. Price: \$2.50, post paid.

"Mass Radiography of the Chest", by Herman E. Hilleboe, M.D., and Russell H. Morgan, M.D.; 1945. Chicago: The Year Book Publishers Incorporated. 7" x 43", pp. 288, with many illustrations. Price: \$3.50, post paid.

"The 1944 Year Book of General Therapeutics", by Oscar W. Bethea, Ph.M., M.D., F.A.C.P.; 1944. Chicago: The Year Book Publishers Incorporated. 7" x 43", pp. 447, with many illustrations. Price: 23s. 6d.

"Annals of the University of Otago Medical School, 1837-1939", by D. W. Carmalt Jones; 1945. Wellington: A. H. and A. W. Reed. 51" x 81", pp. 286, with 12 illustrations.

Diary for the Month.

- Aug. 1.—Victorian Branch, B.M.A.: Branch Meeting.
- Aug. 1.—Western Australian Branch, B.M.A.: Council Meeting.
- Aug. 2.—South Australian Branch, B.M.A.: Council Meeting.
- Aug. 3.—Queensland Branch, B.M.A.: Branch Meeting.
- Aug. 7.—New South Wales Branch, B.M.A.: Organization and Science Committee.
- Aug. 10.—Queensland Branch, B.M.A.: Council Meeting.
- Aug. 13.—Victorian Branch, B.M.A.: Hospital Subcommittee.
- Aug. 13.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.
- Aug. 14.—Tasmanian Branch, B.M.A.: Ordinary Meeting.
- Aug. 14.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
- Aug. 14.—Victorian Branch, B.M.A.: Organization Subcommittee.
- Aug. 15.—Western Australian Branch, B.M.A.: General Meeting.
- Aug. 16.—Victorian Branch, B.M.A.: Executive Committee.
- Aug. 16.—South Australian Branch, B.M.A.: Council Meeting.
- Aug. 21.—New South Wales Branch, B.M.A.: Medical Politics Committee.
- Aug. 22.—Victorian Branch, B.M.A.: Council Meeting.
- Aug. 23.—New South Wales Branch, B.M.A.: Clinical Meeting.
- Aug. 24.—Queensland Branch, B.M.A.: Council Meeting.
- Aug. 28.—New South Wales Branch, B.M.A.: Ethics Committee.
- Aug. 30.—New South Wales Branch, B.M.A.: Branch Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 173, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract practice appointments in Western Australia. All Public Health Department appointments.

Editorial Notices.

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